Henvey Inlet Wind LP

Henvey Inlet Wind

Henvey Inlet Wind Energy Centre – Environmental Assessment – Revised Final Draft

Prepared by:

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Project Number:

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Date:

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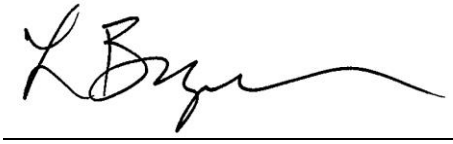
AECOM: 2012-01-06

AECOM Signatures

Report Prepared By:



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AANDC.....Aboriginal Affairs and Northern Development Canada
ACSR .....Aluminum Conductor Steel Reinforced
AECOM .....AECOM Canada Ltd.
ANSI.....Area of Natural and Scientific Interest
AQI .....Air Quality Index
AWWI .....American Wind Wildlife Institute
ATRIS.....Aboriginal Treaty Information Research System
ATV .....All-Terrain-Vehicle
BMPs.....Best management practices
CCME.....Canadian Council of Ministers of the Environment
CEAA .....*Canadian Environmental Assessment Act*
CIC .....Community Information Centre
CL.....Centerline
COSEWIC .....Committee on the Status of Endangered Wildlife in Canada
CSA.....Canadian Standards Association
CWS.....Canadian Wildlife Service
dB.....Decibels
dBA .....Decibels A-weighted
DFO.....Fisheries and Oceans Canada
DND .....Department of National Defence
DSB.....District Services Board
EA .....Environmental Assessment
EC .....Environment Canada
ELC .....Ecological Land Classification
EPP .....Environmental Protection Plan
EEMP .....Environmental Effects Monitoring Plan
ERT .....Environmental Review Tribunal
ESA .....*Endangered Species Act*
FIT.....Feed-in-Tariff
FNLMA.....*First Nations Land Management Act*
GHG.....Greenhouse gas
GIS.....Geographic Information System
GSC .....Geological Survey of Canada
ha .....Hectare
HIFN.....Henvey Inlet First Nation
HIFN EA Guidance ....Henvey Inlet First Nation Environmental Assessment Guidance Instrument
HIFN I.R. #2 .....Henvey Inlet First Nation Reserve No. 2
HIW .....Henvey Inlet Wind
HIWEC .....Henvey Inlet Wind Energy Centre
HONI .....Hydro One Network Inc.
hr .....Hour
IBA .....Important Bird Area

IESO.....Independent Electricity System Operator
IWH .....Important Wildlife Habitat
KRAA .....Key River Area Association
km .....Kilometres
km/hr .....Kilometres per hour
km^2 .....Kilometres squared
kV .....Kilovolt
L .....Litres
L/day .....Litres per day
LGL .....LGL Limited
LIO .....Land Information Ontario
m .....Metre
m^2 .....Metres squared
mm .....Millimetres
mASL .....Metres Above Sea Level
MBCA.....*Migratory Birds Convention Act*
MBS .....Migratory Bird Sanctuaries
mg/L .....Milligrams per litre
Met Towers .....Meteorological Towers
MNDM .....Ontario Ministry of Northern Development and Mines
MNO.....Métis Nation of Ontario
MNRF.....Ontario Ministry of Natural Resources and Forestry
MOECC.....Ontario Ministry of the Environment and Climate Change
MPAC.....Municipal Property Assessment Corporation
MSDS.....Material Safety Data Sheets
MTO .....Ontario Ministry of Transportation
MW.....Megawatt
NHA.....Natural Heritage Assessment
NAV CANADA.....Navigation Canada
NHIC .....Natural Heritage Information Centre
Nigig.....Nigig Power Corporation
NRCan .....Natural Resources Canada
NRVIS .....Natural Resources and Values Information System
NWA.....National Wildlife Areas
NWCC..... National Wind Coordinating Collaborative
O.Reg. .....Ontario Regulation
O&M.....Operations and Maintenance
OBBA .....Ontario Breeding Bird Atlas
OEB.....Ontario Energy Board
OGS .....Ontario Geological Survey
OPA.....Ontario Power Authority
OPGW.....Optical Ground Wire
OWES .....Ontario Wetland Evaluation System
pH.....Measurement of acidity or alkalinity

PIC .....Public Information Centre
PIWs.....Provincially Important Wetlands
PSDSSAB .....Parry Sound District Social Services Administrative Board
PWQO.....Provincial Water Quality Objectives
RABC .....Radio Advisory Board of Canada
RCMP.....Royal Canadian Mounted Police
ROW .....Right-of-way
SAR.....Species at Risk
SARA .....*Species at Risk Act*
SCADA.....Supervisory Control and Data Acquisition
SOCC.....Species of Conservation Concern
SODAR .....Sonic Detection and Ranging
Stantec.....Stantec Consulting Ltd.
TS.....Transformer Station
TSA .....Transformer Station Areas
UNESCO.....United Nations Education, Scientific, and Cultural Organization
UTM .....Universal Transverse Mercator
V.....Volts
VEC.....Valued Ecosystem Component
WHSRN.....Western Hemisphere Shorebird Reserve Network
WTG.....Wind Turbine Generator
ZOI .....Zone of influence

1. Introduction and Overview

Nigig Power Corporation (Nigig) received a Feed-in-Tariff (FIT) Contract from the Ontario Power Authority (OPA) in 2011 for a 300 megawatt (MW) wind energy generation centre. Henvey Inlet Wind LP (HIW), a limited partnership between Pattern Renewable Holdings Canada ULC and Nigig Power Corporation, is proposing to develop the Henvey Inlet Wind Energy Centre (HIWEC), a 300 MW facility on Henvey Inlet First Nation Reserve No. 2 (HIFN I.R. #2). AECOM Canada Ltd. (AECOM) was retained by HIW to prepare an Environmental Assessment (EA) for the proposed HIWEC. The EA was conducted in accordance with the Henvey Inlet First Nation Environmental Assessment Guidance Instrument (HIFN EA Guidance) requirements.

The purpose of this Final Draft EA Report is to present the findings of the EA studies and provide an opportunity for the Henvey Inlet First Nation (HIFN) community and public to comment on the findings. The information presented in this report includes the information from the Interim Draft EA Report as well as details from the 2015 field studies and the second round of community and public consultation conducted in the spring and summer of 2015.

1.1 Overview

HIFN I.R. #2 is a parcel of federal Crown land on the shore of Georgian Bay at Key River (approximately 80 kilometres (km) north of Parry Sound, Ontario) held by the Crown subject to the Aboriginal title of and for the benefit of HIFN. A small residential area comprised of HIFN Band Members is located immediately west of Highway 69 on Bekanon Road. Private, largely seasonal, cottage lot leases are located on the north side of Henvey Inlet and several HIFN Band Members have cabins within the HIWEC study area described in **Section 2.1**. Several HIFN Band Members utilize recreational lots within the HIWEC study area. The remainder of the study area is undeveloped and unpopulated.

HIFN I.R. #2 has been in active use by HIFN since pre-contact for habitation, hunting, fishing, gathering, burial, traditional use and cultural gatherings. In recent times, HIFN has used these lands for hunting, fishing, gathering, traditional use and cultural gatherings, forestry, aggregate extraction, waste management, and recreation. There have also been various proposals for commercial and economic development. HIFN requires that any future development be located to protect areas of cultural importance. The proposed HIWEC will have precedence over general uses of these lands, but otherwise these uses may continue.

The HIWEC will use wind to generate energy through the use of commercial WTG technology. The HIWEC will also include pad-mounted transformers, crane pads, 34.5 kilovolts (kV) overhead and / or underground electrical collector cables, communication lines, meteorological (Met) towers, access roads, an operations and maintenance (O&M) building, an on-Reserve transmission line (230 kV) within the study area, two (2) 34.5 – 230 kV transformer stations (TSs), construction compounds and storage yards. It will include other ancillary facilities as required, such as a concrete batch plant(s), crusher(s), and parking areas.

The EA assesses 120 wind turbine generators (WTGs) for the HIWEC; however, only up to 91 WTGs will be constructed. To date, 21 of the 120 WTG locations have been identified for removal based on technical and environmental studies completed and comments received from HIFN members and the public. The EA is based on the 120 WTG layout and the permanent HIWEC footprint will be approximately 250 hectares (ha) based on installation of 120 WTGs. This footprint represents 2% of the land within the approximately 12,278 ha that constitute the HIWEC study area. A summary of the reduction in disturbance footprints for the 120 WTG layout to the 99 WTG layout is presented in **Section 6.2.7.1.1**. The final layout of (up to) 91 WTGs will result in approximately 20-25% reduction in the overall footprint from what is presented in this EA based on 120 WTGs.

HIFN has broad authority to manage and protect its Reserve lands. This authority comes from the *First Nations Land Management Act* (*FNLMA*), related instruments, and the HIFN Land Code. On August 9th, 2015, HIFN approved a Land Law allowing for the lease of HIFN I.R. #2 lands for the HIWEC. This authority includes responsibility for environmental protection and the environmental assessment of projects and physical activities on Reserve lands.

Off-Reserve there will be a new Transmission Line to deliver the electricity generated by the HIWEC to the Ontario electricity grid. The HIW FIT Contract awarded in 2011 has an approved interconnection point south of Parry Sound to the 230 kV Hydro One Network Inc. (HONI) system (Route B). In addition to the assessment of interconnection of Route B, HIW in close consultation and discussions with the Independent Electricity System Operator (IESO), HONI and expert consultants, conducted a technical and legal assessment of the possibility of amending the FIT Contract to permit interconnection at the HONI 500 kV circuit (Route A) to reduce the overall length of transmission required for the HIWEC. The FIT Contract amendment was not approved and the assessment has resulted in the conclusion that the current technically and legally viable interconnection point for the HIWEC is the connection point south of Parry Sound to the 230 kV HONI system (Route B), and HIW will continue exclusive assessment and development of that interconnection point and the associated Transmission Line.

The off-Reserve Transmission Line is not within the regulatory authority of HIFN powers and responsibilities set out in the *FNLMA* or the Land Code. The off-Reserve Transmission Line is undergoing an EA under Ontario Regulation (O.Reg.) 116/01. However, HIFN requested that this EA consider this off-Reserve electricity transmission and its effects so that HIFN may fully understand the implications of approving what is proposed on-Reserve. The off-Reserve Transmission Line is described in **Volume B**.

1.2 Purpose

The province of Ontario's Long Term Energy Plan (Ontario Ministry of Energy, 2013), which is predated by the Integrated Power System Plan (Ontario Ministry of Energy, 2008), establishes a goal of bringing 20,000 MW of renewable energy online by 2025. As part of the effort to achieve this goal, Nigig was awarded a FIT contract to develop a 300 MW wind energy generation centre on HIFN I.R. #2. It will be a large-scale renewable energy centre capable of providing substantial economic benefits to HIFN's local economy. It will also provide economic spin-off benefits accruing to communities outside of HIFN related to procurement, construction and operation. Renewable energy contributes to a reduced reliance on fossil fuel based power generation resulting in additional environmental benefits such as reduced greenhouse gas (GHG) emissions.

1.3 Regulatory Framework

Multiple permits, licenses, and authorizations may be required to facilitate the development of the HIWEC. The ultimate applicability of all permits, licenses, and authorizations will be determined by and based upon the facility design. The following sections detail any potentially applicable regulatory approvals.

1.3.1 Henvey Inlet First Nation

Pursuant to the *FNLMA*, the Government of Canada and HIFN have entered into agreements regarding the management of HIFN's Reserve lands, namely the Framework Agreement on Management of First Nation Land and an Individual Agreement. In 2009, HIFN adopted a formal Land Code which was amended in 2012 to apply to HIFN I.R. #2. Pursuant to these instruments, HIFN's Band Council is the decision-making authority with respect to the creation and granting of interests in lands within HIFN I.R. #2. These instruments also provide HIFN Band Council with the legislative, regulatory, and executive authority to ensure environmental management of the Reserve. This authority includes responsibility for EAs, permitting, and environmental protection for projects on HIFN lands.

HIFN has developed principles that address its overall requirements for EA and environmental protection. The principles are documented in the HIFN Environmental Stewardship Regime (HIFN, 2015). The HIWEC EA was conducted in accordance with these principles, applicable HIFN laws, and approved HIFN EA Guidance. A key principle is that "to promote the avoidance or mitigation of adverse environmental effects, the EA will provide for protection of Nishshing Aki on Reserve lands and otherwise consider federal environmental protection laws and standards of environmental protection similar to those applied to wind energy generation facilities located in Ontario, not on Reserve lands." Thus, the main body of this EA document is structured similar to typical federal EA requirements while the appendices are structured similar to typical provincial requirements. This document includes the following appendices:

Appendix A. HIWEC Description Report
Appendix B. HIWEC Construction Plan Report
Appendix C. HIWEC Design and Operations Report
Appendix D. HIWEC Decommissioning Plan Report
Appendix E. HIWEC Wind Turbine Specifications Report
Appendix F. HIWEC Natural Heritage Assessment
Appendix G. HIWEC Environmental Effects Monitoring Plan
Appendix H. HIWEC Water Assessment and Waterbody Report
Appendix I. HIWEC Consultation Report
Appendix J. HIWEC Hydrogeological Assessment and Effects Assessment
Appendix K. HIWEC Archaeological Assessments
Appendix L. HIWEC Heritage Assessment Report
Appendix M. Renewable Energy Approval Application – Noise Impact Assessment

The EA must be acceptable to HIFN before HIFN decides whether to issue an environmental permit for the HIWEC. If HIFN decides to issue a permit approving the HIWEC, it will use the EA to assist in developing terms and conditions of approval that may be enforced through its environmental protection laws, powers and responsibilities.

1.3.2 Federal

Table 1-1 provides a list of potentially applicable permits and approvals with federal departments and agencies. Any applicable federal permits and approvals required for the HIWEC will be confirmed during the development process prior to construction. A *Species at Risk Act* (*SARA*) permit from Environment Canada-Canadian Wildlife Service (EC-CWS) may be required for activities that affect a species listed as threatened or endangered. If a permit is required, EC-CWS will determine the likelihood of significant environmental effects of the HIWEC under section 67 of the *Canadian Environmental Assessment Act, 2012* (*CEAA 2012*).

Table 1-1: Potentially Applicable Federal Permits and Approvals

Permit / Approval	Approval Authority	Details
Aeronautical Obstruction Clearance (Lighting scheme)	Transport Canada – Aviation Division	Required for WTG marking and lighting
Navigation Protection Act Application for Approval	Transport Canada – Marine Division	Required if crossing a navigable watercourse
Explosives In Transit Permit (*Explosives Act*, 2013)	Natural Resources Canada (NRCan) - Explosives Regulatory Division	Required to transport explosives
Temporary magazine license (section 7(1) of the *Explosives Act*)	NRCan - Explosives Regulatory Division	Required to acquire and store certain explosives and equipment over specified quantities

Table 1-1: Potentially Applicable Federal Permits and Approvals

Permit / Approval	Approval Authority	Details
Permit or approvals under *Species at Risk Act, 2002*	EC-CWS	Required if the HIWEC will destroy or remove Species at Risk (SAR) or critical habitat for SAR, or to collect and transport a SAR out of the construction or operation area
Permit to collect bird carcasses of species listed as endangered or threatened (*Species at Risk Act, 2002*)	EC-CWS	Required to collect carcasses of endangered or threatened bird species during bird mortality surveys
Permit under *Migratory Birds Convention Act* to collect bird carcasses	EC- CWS	Required to collect carcasses of bird species protected by the *Migratory Birds Convention Act* (*MBCA*) during bird mortality surveys
Authorization for watercourse crossing (*Fisheries Act*, subsection 35(2))	Fisheries and Oceans Canada (DFO)	Potentially required if a proposed work, undertaking or activity result in serious harm to fish
Aviation Safety Land Use proposal	Navigation Canada (NAV CANADA)	Required for all land use proposals near airports and air navigation infrastructure
Mandatory Coordination Contacts	Radio Advisory Board of Canada (RABC)	Recommended process to contact the following organizations for wind energy centres: ▪ Industry Canada - General Radio Frequency Database - Spectrum Direct - Broadcasting Database - Integrated Spectrum Observation Centre ▪ Department of National Defence (DND) - DND Radiocommunication Systems - Military Air Defence and Air Traffic Control Radars ▪ Royal Canadian Mounted Police (RCMP) - Wind Farm Coordinator ▪ Environment Canada (EC) - Weather Radars ▪ NAV CANADA - Land-use Clearance
Review of proposal by the RCMP Mobile Communications Services	RCMP	Recommended review for potential signal disruptions from wind energy centres

1.3.3 Provincial

Because HIFN I.R. #2 is under HIFN jurisdiction, the majority of provincial permits, licenses and authorizations do not apply to the HIWEC. However, there are some exceptions to this; for example, there are several requirements through the IESO to be met for the HIWEC to connect to the provincial grid. **Table 1-2** provides a list of potentially applicable permits and approvals from provincial ministries and agencies. Any applicable provincial permits and approvals required for the HIWEC will be confirmed during the development process and in place prior to the related work element for construction or for operations, as applicable.

Table 1-2: Potentially Applicable Provincial Permits and Approvals

Permit / Approval	Approval Authority	Details
Notice of Proposal Prohibition, transmission or distribution by generators (Section 80 of the *Ontario Energy Board Act*).	Ontario Energy Board (OEB)	Notification to the OEB is required to construct a generation facility

Table 1-2: Potentially Applicable Provincial Permits and Approvals

Permit / Approval	Approval Authority	Details
Leave to Construct (Section 92 of the *Ontario Energy Board Act*)	OEB	Required for the development of a high-voltage transmission facility
License to Generate Electricity (Section 57 of the *Ontario Energy Board Act*)	OEB	Required to generate electricity or provide ancillary services for sale through the IESO-administered markets or directly to another person without a license
License to Transmit Electricity	OEB	Required for transmission of electrical power to interconnect with provincial grid
Facility Registration	IESO	Registration for a physical generation facility that is connecting to the IESO-controlled grid, will participate in the IESO-administered markets or programs, or is required by a Connection Assessment to register with the IESO
Connection Application	HONI / IESO	The customer completes the System Impact Assessment / Customer Impact Assessment application for a generation facility and submits to both HONI and the IESO
Connection and Cost Recovery Agreement	HONI	An agreement between HIW and HONI which includes the recovery of costs to grid operator of changes to allow connection, scope of work, costs, payment schedule, etc.
Certificate of Inspection and authorization to connect	Electrical Safety Authority	Ensure work complies with Ontario Electrical Safety Code

1.3.4 Municipal

Because HIFN I.R. #2 is federal Crown land, municipal permits, licenses and authorizations do not apply.

2. Project Description

2.1 Location and Study Area

The HIWEC study area includes the entirety of HIFN I.R. #2 plus a 550 metre (m) buffer extending beyond the HIFN I.R. #2 boundary. HIFN I.R. #2 is bounded on the north by the Key River, Georgian Bay to the west, Highway 69 to the east with some HIFN I.R. #2 property located on the east side of Highway 69. The southern boundary runs from Sandy Bay on the southwest corner in a north easterly direction to Highway 69 south of Bekanon Road. The geographic location is along the eastern shore of Georgian Bay, south of French River Provincial Park and directly north of North Georgian Bay Shoreline and Islands Conservation Reserve (**Figure 2-1**). HIFN I.R. #2 is part of the Georgian Bay Biosphere Reserve which encompasses 347,000 ha of land stretching 300 km from Port Severn to the French River and is designated as a United Nations Educational, Scientific, and Cultural Organization (UNESCO) Biosphere Reserve (Georgian Bay Biosphere, 2015). Highway 69 is a major north-south highway connecting Highway 400 north of Parry Sound with the City of Greater Sudbury at Highway 17.

Generally, the HIWEC study area has shallow soils, with many rocky outcrops forming longitudinal ridges running on a northwest to southeast axis, and is divided roughly in half by the Henvey Inlet waterbody. Numerous wetland pockets are located between the ridges and across the study area, with upland regions supporting forested areas of poplar and jack pine. **Section 4** provides a more detailed description of the existing environmental conditions within the study area. The study area for the HIWEC also includes lands off-Reserve that are within the area that may experience increased noise levels from the HIWEC. All HIWEC components will be located within the HIWEC study area as shown in the site plan provided as **Figure 2-2**.

2.2 Components

2.2.1 Permanent Components

2.2.1.1 Wind Turbine Generators and Foundations

As shown on **Figure 2-2**, 120 commercial WTGs are being assessed for the HIWEC with only up to 91 WTGs ultimately being constructed. The selected WTG technology is the Vestas V126-3.3MW Turbine, with a nominal power of 3.3 MW. The WTGs are an upwind, horizontal axis unit, with three (3) rotor blades (roughly 61.66 m in length) and a maximum hub height of up to 137 m. The nacelle on each WTG will be located at the top of the tower and will consist of a generator, gearbox, bearings, couplings, and auxiliary equipment. Typically, the nacelle cover is constructed from reinforced fiberglass and the blades are constructed from fiberglass along with epoxy resin. The WTG tower will be constructed from tubular steel or concrete with an approximate diameter of 5 m at the base. The tower contains an internal ladder for maintenance access.

The maximum height of the WTG from base to the blade tip is approximately 200 m. External lighting will be required on some of the WTGs and will be installed in accordance with the Transport Canada and NAV CANADA requirements.

Geotechnical assessments will be used to determine the most suitable foundation design for each WTG. Where site specific conditions permit, rock anchors may be used to bolt the WTGs to bedrock. Alternatively, gravity spread concrete footings could be used. The foundation design will include conduits to connect to the collector system and a grounding grid consisting of copper or aluminum wire and ground rods.

The land area required for each WTG will be dependent upon the final locations of the WTGs relative to access roads, associated infrastructure, and adjacent environmental and terrain features. A typical WTG layout for the HIWEC is provided in **Figure 2-3**.

Figure 2-1: Study Area

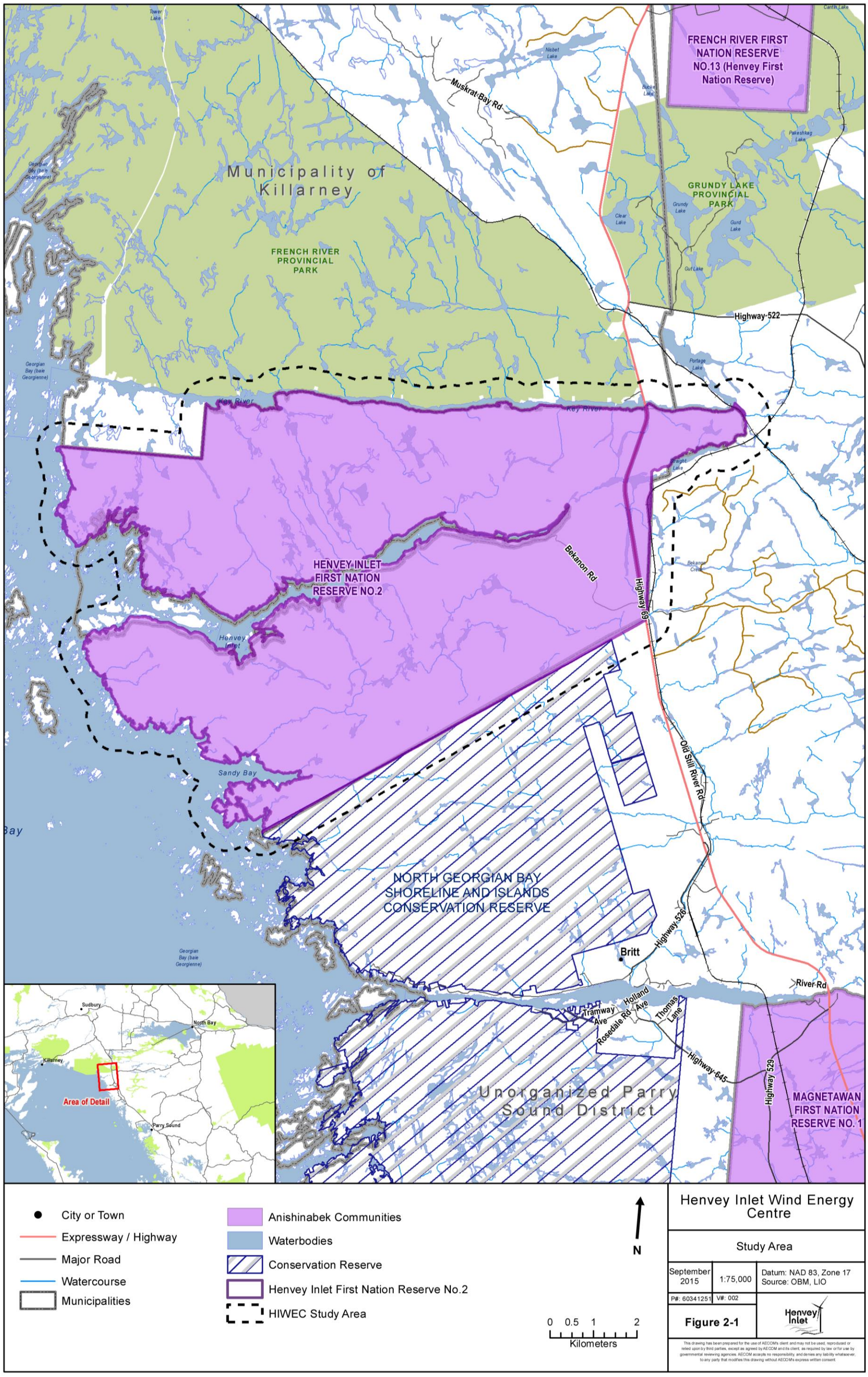


Figure 2-2: Site Plan

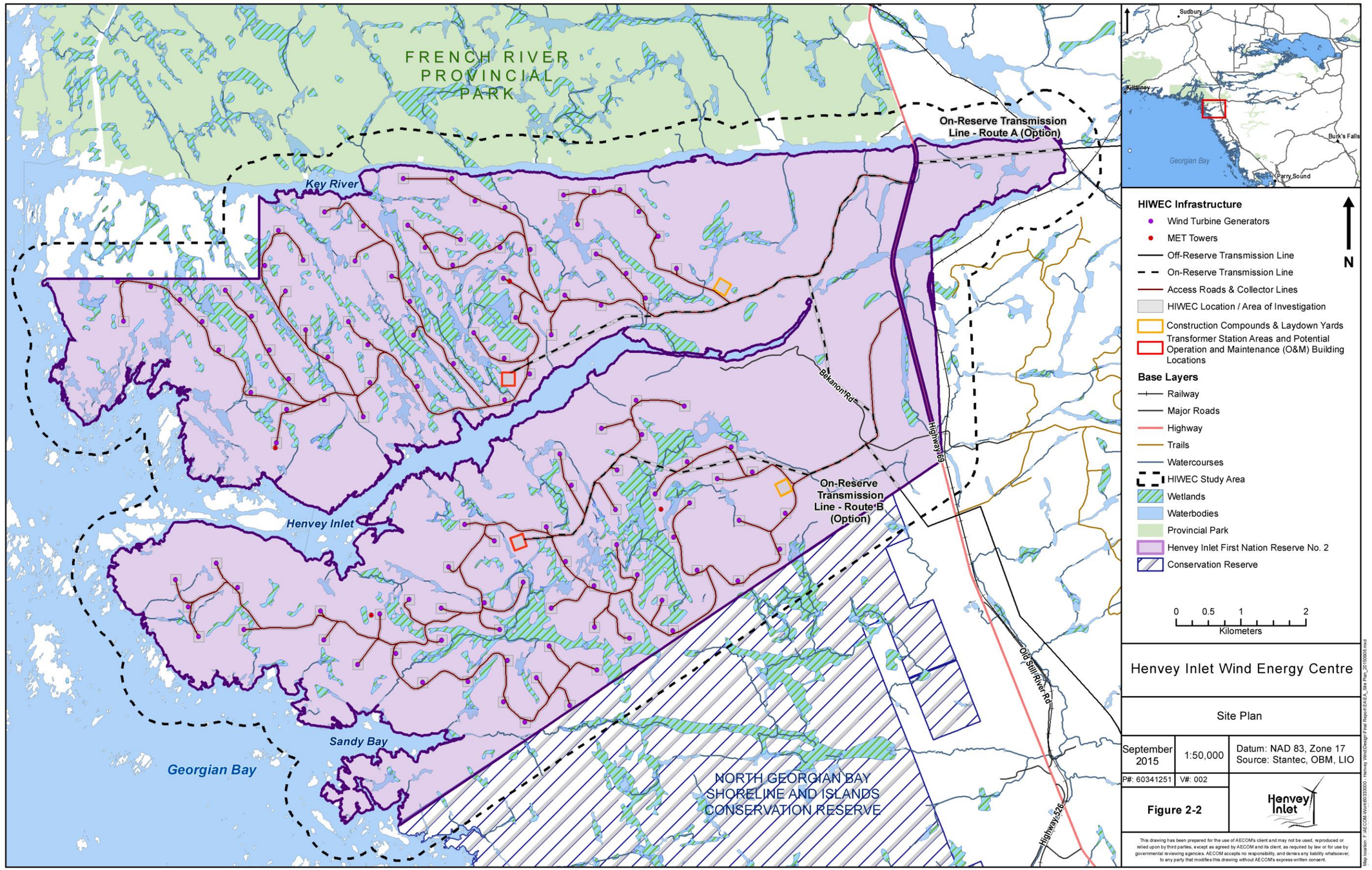
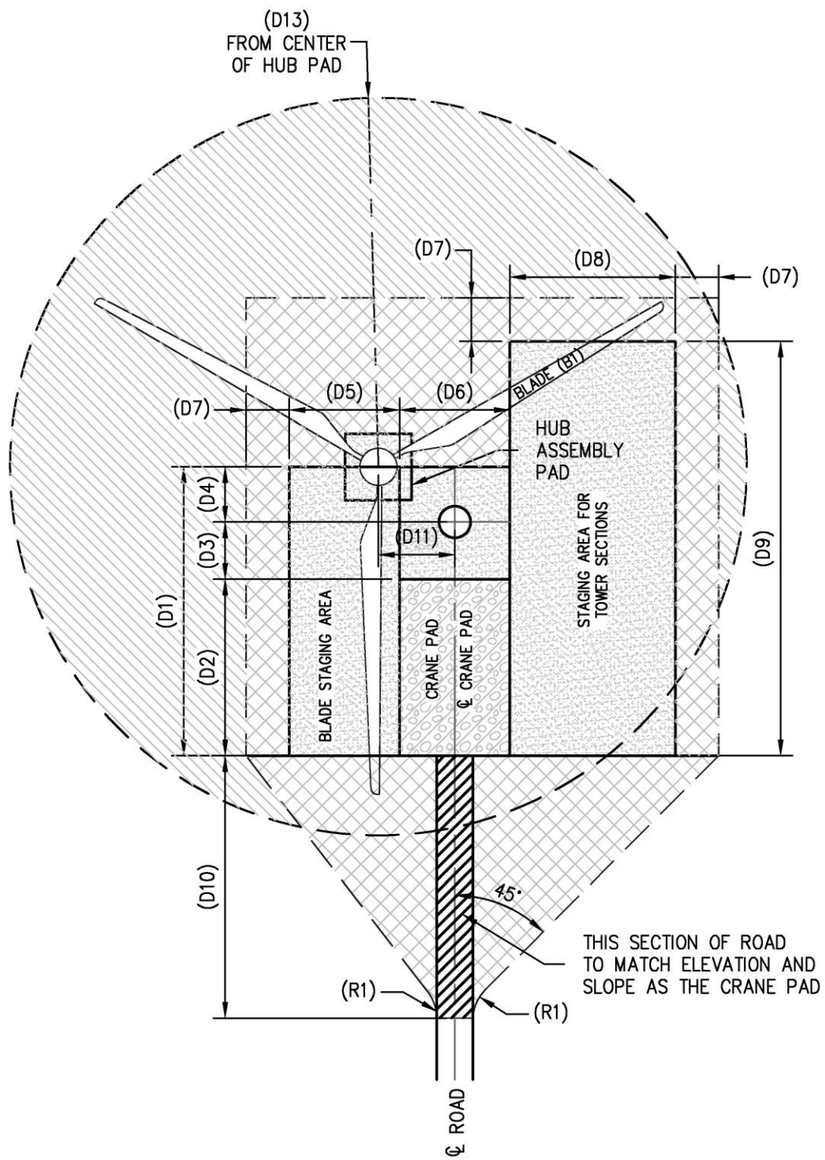


Figure 2-3: Typical WTG Layout



(T1)	12"	0.3m
(B1)	161'	49.1m
(D1)	132'	40.2m
(D2)	80'	24.4m
(D3)	26'	7.9m
(D4)	26'	7.9m
(D5)	50'	15.2m
(D6)	50'	15.2m
(D7)	5'	1.5m
(D8)	75'	22.9m
(D9)	187'	57.0m
(D10)	119'	36.3m
(D11)	35'	10.7m
(D13)	169	51.5m

NOTES:

1. TURBINE DOOR SHOULD ALWAYS BE DOWNWIND.
2. CRANE PAD SHALL DRAIN AWAY FROM TURBINE WITH A MAX. SLOPE OF 1%.
3. DIMENSIONS AND ARRANGEMENT SHOWN ARE FOR ILLUSTRATIVE PURPOSES AND ARE SUBJECT TO CHANGE BASED ON SITE CONDITIONS.
4. ADJUST PADS AND LAYDOWN AREAS FOR SITE CONDITIONS. CLEAR VEGETATION ADJACENT TO SITE FOR TURBINE ASSEMBLY AND LAYDOWN AREAS AS SHOWN.
5. RELATIVE DISTANCE BETWEEN ROAD AND TURBINE MAY VARY DEPENDING ON SITE CONDITIONS.
6. REFER TO ROAD SECTIONS DETAIL SHEET FOR GENERAL GRADING NOTES.
7. TOPSOIL UNDERCUT DEPTH DEPENDS ON SITE CONDITIONS. FOR CRANEPAD UNDERCUT EXISTING TOP SOIL DOWN TO NATIVE SOIL AND AN ADDITIONAL 3". FOR AREAS WITH DEEP TOPSOIL (I.E. > 8") CUT TO NATIVE SOIL ONLY.
8. ALL SUB-GRADE SURFACES SHALL BE PROOF-ROLLED TO DETECT SOFT AREAS.
9. WHERE REQUIRED THE TOPSOIL IS TO BE STRIPPED TO THE LEVEL OF A SUITABLE FORMATION, EXCAVATED MATERIAL IS TO BE STOCKPILED ON SITE IN DESIGNATED AREAS AS SPECIFIED BY RES.
10. IF ROTOR ASSEMBLY OCCURS ON THE GROUND, IT REQUIRES A CLEARED AREA FOR THE HUB INCLUDING BLADES WITH A MAXIMUM GRADIENT OF 1:20 OR 5%.
11. CRANE PAD AND STAGING AREAS SHOULD PROVIDE A MINIMUM 4,200 PSF BEARING PRESSURE.
12. MAXIMUM GRADIENT/SLOPE OF STAGING AREAS SHOULD BE APPROXIMATELY 2%.
13. STAGING AREAS AREA COMPACTED NATIVE MATERIAL ONLY. NO GRAVEL OR ROAD BASE PLANNED FOR THESE AREAS.
14. FOR EROSION CONTROL AND CONSTRUCTION ENTRANCE DETAIL, PLEASE REFER TO SWPPP DOCUMENTS PREPARED UNDER SEPARATE COVER.

LEGEND:

- (T1) MIN. COMPACTED THICKNESS OF GRAVEL ON CRANE PADS (TYP). CRANES TO USE TIMBER MATS FOR ALL HEAVY LIFTS. (SEE CRANE PAD DETAIL)
- COMPACTED SUBGRADE
- AREA TO BE CLEARED AND LEVELED FOR CRANE PAD
- AREA TO BE GRUBBED AND CLEARED

1 DETAIL: TYPICAL CRANE PAD ARRANGEMENT-END

Scale: N.T.S.

RES AMERICA CONSTRUCTION INC.
11101 W 120TH AVE, SUITE 400 BROOMFIELD, CO 80021
TELEPHONE: (303) 439-4200, FAX: (303) 439-4299

DRAWING NUMBER: CP2

[kcurry] [Aug 06, 2015 – 12:55pm] [T:\CAD\standard details\01-Site Details\CP2.dwg]

2.2.1.2 Access Roads and Crane Pads

Access roads will be constructed to support construction, operations, and decommissioning activities and to provide access to WTGs and other HIWEC infrastructure. Access roads will be designed to minimize the effects on the environment (e.g., maintaining local drainage patterns and minimizing width of disturbance). Access roads will use crushed gravel and range from 5 to 20 m wide, with additional travel clearance required to accommodate large cranes and equipment transport during construction and decommissioning. In some locations it is anticipated that rock will need to be blasted and some areas filled with crushed rock to reduce grades to allow vehicles to bring in required equipment, cranes and WTG components.

Access roads that intersect with Highway 69 will be designed in accordance with Ontario Ministry of Transportation (MTO) standards. Applicable MTO permits will be obtained prior to construction.

Crane pads will be required to be constructed at each WTG. Typical crane pads are approximately 20 x 30 m in size. Final crane pad design will be determined based the specific requirements of the cranes used for the HIWEC. Crane pads will remain in place to support any crane activities during the operations and / or decommissioning phases of the HIWEC.

2.2.1.3 Meteorological Towers

Meteorological (Met) towers are required during the operations phase to validate the performance of the WTGs and provide meteorological data to the IESO to support their wind forecasting activities and operation of the provincial electrical system. Met towers will be connected to the O&M building via fibre optic cables (either overhead and / or underground). Four (4) Met towers will be utilized and their locations can be found in **Figure 2-2**. As needed, additional meteorological equipment will be used to meet IESO market requirements.

Given the rocky nature of the site, Met tower bases are bolted to surface bedrock with guy wires and anchors for lateral support. All Met towers have been installed as per IESO requirements and the Canadian Standards Association (CSA) protocol for power performance measurements.

2.2.1.4 Pad-Mounted Transformers and Collector Lines

A pad-mounted transformer will be located at the base of each WTG to step-up the voltage of electricity generated to the collector system voltage (e.g., 690 volts (V) to 34.5 kV). Each pad-mounted transformer will be affixed to a precast or poured in place concrete pad. Power cables entering and exiting the pad-mounted transformer will be installed underground along with a grounding grid consisting of copper or aluminum wire and grounding rods.

From each pad-mounted transformer, above or below ground 34.5 kV collector lines will carry electricity from the WTGs to the HIWEC's TSs. Fibre optic communication lines will be installed along with the collector system.

The collector lines may include overhead or below ground sections dependent on site specific conditions; however, it is anticipated that the collector system will be primarily aboveground due to the rocky nature of the site. Aboveground collector lines will be constructed on standard single wooden pole structures. Collector lines will generally follow the access roads to reduce construction area and to minimize potential construction effects. Water crossings for the collector lines will likely be overhead and will be constructed according to the federal and provincial requirements.

2.2.1.5 Transformer Stations

Two (2) TSs will be constructed on HIFN I.R. #2 to step up the 34.5 kV voltage of the collector lines to the 230 kV voltage of the Transmission Line that will transport electricity to the provincial transmission grid. One (1) TS will be located on the north side and the other on the south side as shown in **Figure 2-2**.

The HIWEC TSs will consist primarily of power transformers, grounding transformers, 34.5 kV and 230 kV circuit breakers and disconnect switches, surge arrestors, instrument transformers, meters, a protection and control building, and ancillary equipment, along with associated concrete foundations to mount the equipment. The HIWEC TSs will be located on a graded area, roughly 50 m x 50 m, which will be confirmed during the detailed design phase. The HIWEC TSs will be fenced and secured to prevent unauthorized entry and maintain public safety. All non-current carrying and conducting metal components within the TS area will be connected to a grounding grid installed below finished grade. A typical TS layout for the HIWEC is provided in **Figure 2-4**.

2.2.1.6 On-Reserve Transmission Towers and Foundations

From the HIWEC TSs, a section of overhead transmission line of 230 kV will be constructed on HIFN I.R #2. The Transmission Line will consist of Aluminum Conductor Steel Reinforced (ACSR) cable. The conductors will be attached to insulators and tower structures that will be approximately 30 to 40 m in height. An Optical Ground Wire (OPGW) will be installed on the transmission line to facilitate communications between the HIWEC and the TSs.

The towers will be steel monopole and / or wood structures directly buried, erected on concrete foundations or bolted to bedrock as appropriate for the tower location. On average, the structures will be spaced approximately 200 to 400 m apart except where site specific conditions require shorter or longer tower spans (e.g., significant changes in line direction, large waterbody crossings, or in compliance with design codes and laws).

2.2.1.7 Operations and Maintenance Building

An O&M building will be constructed to monitor the day-to-day operations of the HIWEC and provide an area for storage of spare parts and maintenance equipment. The O&M building will require a concrete foundation and may include offices, staff parking, a workshop, parts and vehicle storage, a septic system, water well(s), a storage yard, and other ancillary facilities. A typical O&M building plan detail for the HIWEC is provided in **Figure 2-5**.

Fencing will surround the building for security purposes. Domestic water, if required, will be supplied from a water well. Wastewater will be delivered to a septic system or tank for removal off-site. A small amount of domestic solid waste (e.g., garbage, recycling, and organics) will be generated by workers during maintenance activities and will be collected and permanently disposed of at a licensed facility. Power to the O&M building will be supplied through the local distribution network with a back-up, liquid fuel-fired generator.

2.2.2 Temporary Components

During HIWEC construction, lands will be temporarily used for: construction compounds and laydown yards; construction areas surrounding infrastructure including parking areas (e.g., WTG staging areas); concrete batch plant(s); crusher(s) and water withdrawal points. Temporary cleared areas will be minimized as much as possible and will be limited to the minimum area required to safely and efficiently support associated construction activities. Following construction, temporary areas will be restored to a safe and clean condition.

Figure 2-4: Typical TS Layout

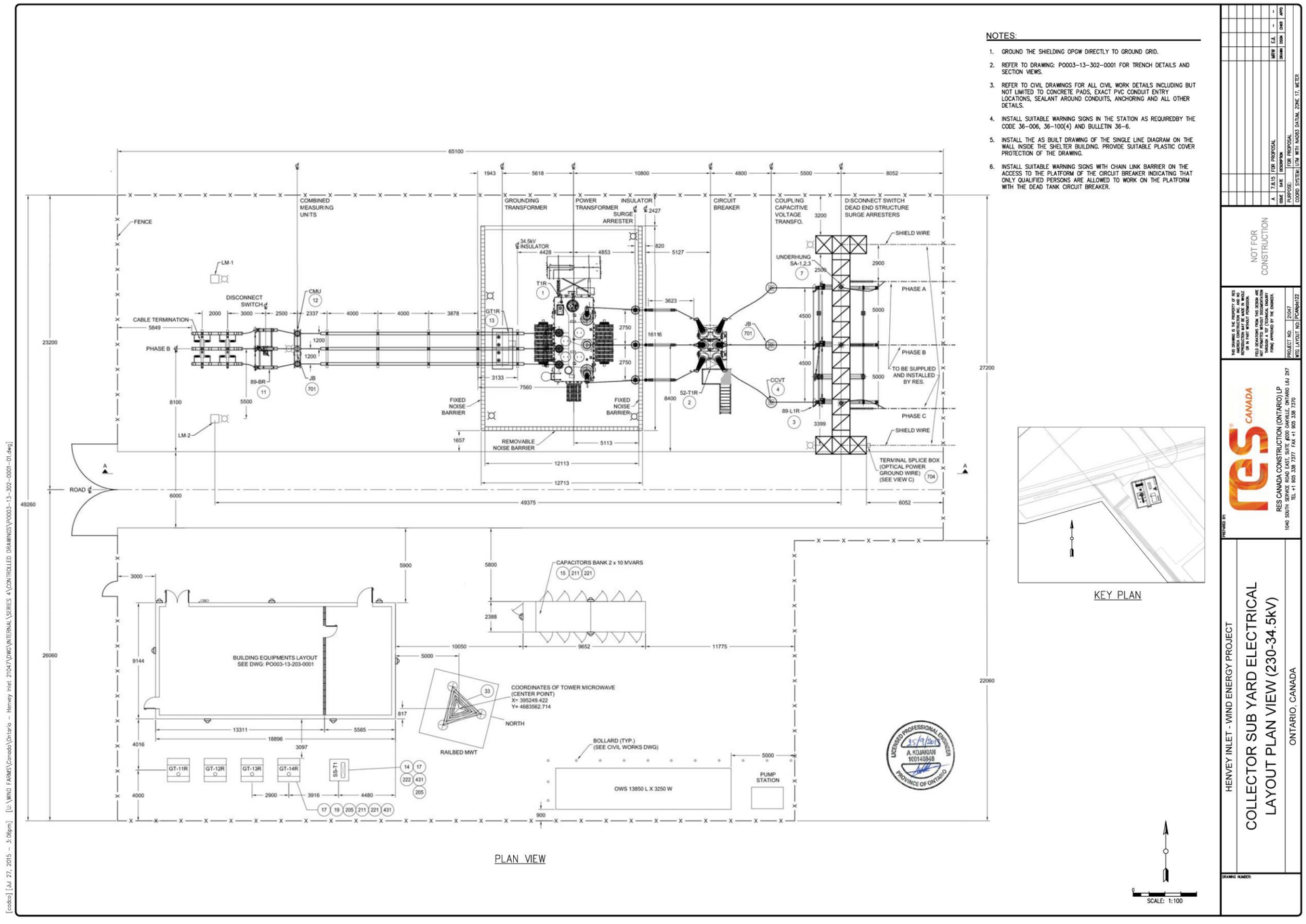
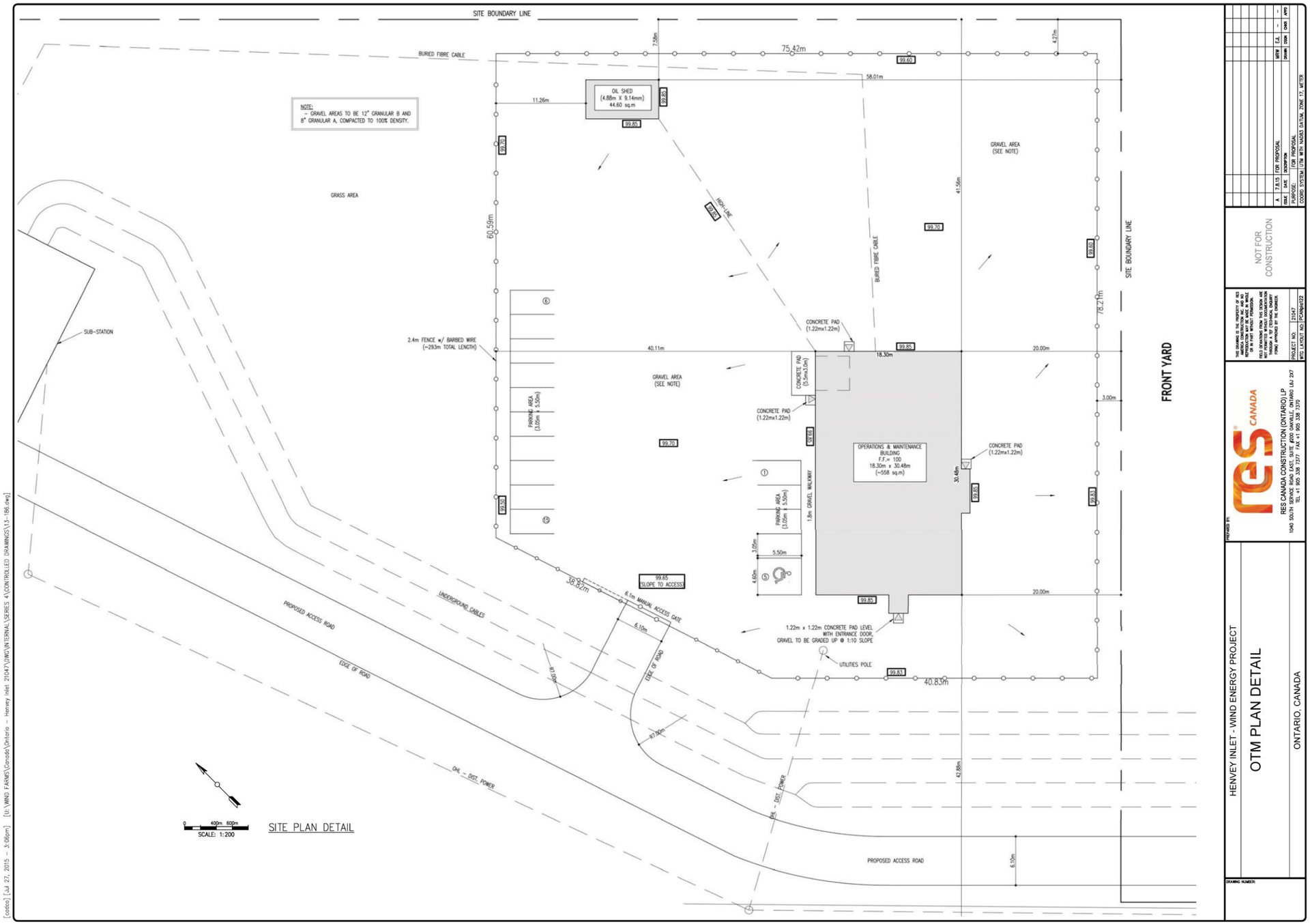


Figure 2-5: Typical O&M Building Plan Detail



2.2.2.1 Construction Compounds & Laydown Yards

Temporary construction compounds and laydown yards will be required to support general construction activities and for temporary storage of WTG components, electrical equipment (e.g., cable reels and pad-mounted transformers), construction materials, containers, vehicles, equipment, office trailers, concrete batch plant(s), crusher(s) and portable toilets. Typically, these areas are cleared and graded. Temporary storage of materials will conform to applicable codes, including any fuel storage which will have adequate secondary containment and bollards for impact protection. The location of the temporary construction compounds and laydown yards are shown in **Figure 2-2**.

2.2.2.2 Wind Turbine Generator Staging Areas

A staging area will be cleared around each WTG location to support assembly of the WTGs, provide space for construction equipment, and for storage of material excavated for foundation construction. Staging areas will be cleared and leveled (with gravel or blasted rock if required) on land adjacent to the base of the WTGs. Geotextile will be used to facilitate removal of gravel following construction activities if required. WTG components will either be delivered to the construction compounds for temporary storage or directly to the staging areas for assembly. If required, portable generator sets used for WTG pre-commissioning may also be located in these areas.

2.2.2.3 Concrete Batch Plant(s)

At least one (1) temporary concrete batch plant will be located within a construction compound and laydown yard, and will produce concrete required for HIWEC construction. A typical concrete batch plant for a wind energy centre of this size would produce around 100 to 150 cubic yards per hour. Site preparation for the plant will consist of clearing, grading and leveling activities. Concrete batching activities will occur in parallel with the relevant HIWEC construction activities (i.e., foundation installation).

Aggregate materials required for concrete will be obtained from local aggregate sources in the vicinity of HIFN I.R. #2.

2.2.2.4 Crusher(s)

One (1) or more temporary crushers will be located within a construction compound and laydown yard, and will crush rock from blasting activities. Blasting will be needed to remove rock for access roads. The crushed rock will then be used to fill areas needed for access roads. Rock crushing requirements for the HIWEC may vary between 150 to 500 tons per hour depending on the scope for the crusher and the type of crusher selected for construction. Site preparation for the crusher will consist of clearing, grading and levelling activities. Crushing activities will occur in parallel with the access road construction.

2.2.2.5 Parking Areas

Parking areas for staff of HIW and its partners will be located in appropriate locations, such as construction compounds and laydown yards.

2.3 Proposed Schedule

Table 2-1 below outlines the anticipated timelines for the development of the HIWEC:

Table 2-1: HIWEC Milestones

HIWEC Milestone	Anticipated Date
Host Public Information Centre #1	February 2015
Complete Interim Draft EA Reports	June 2015
Host Public Information Centre #2	July 2015
Submit Final Draft EA Report to HIFN	September 2015
Submit Final EA Report to HIFN	November 2015
Permit Decision by HIFN	December 2015
Obtain Pre-Construction Permits	March 2016
Start Construction	May 2016
Commence Operations and Maintenance	February 2018

2.4 Construction Phase

Activities that may occur during the pre-construction phase include: planning and resource management, pre-construction surveys, geotechnical investigations, Met tower installation, permitting and detailed design.

The construction phase may consist of the following key activities:

- **Site preparation**
  - Delineation of work area and installation of erosion and sedimentation control measures
  - Vegetation clearing and site grading
  - Delineation and preparation of temporary work areas
- **Construction of access roads and laydown areas**
  - Construction of access roads as required (including blasting)
  - Installation of temporary facilities including concrete batch plant(s), crusher(s), WTG staging areas, construction compounds and laydown yards
- **Transportation of equipment and materials**
  - On-site delivery of construction vehicles, equipment and materials
- **Foundation excavation and construction**
  - Installation (includes excavation, blasting and construction as required) of WTG foundations
  - Installation (includes excavation, blasting and construction as required) of crane pads
  - Installation (includes excavation, blasting and construction as required) of pad-mounted transformers
  - Installation (includes excavation, blasting and construction as required) of TS foundations
  - Installation (includes excavation, blasting and construction as required) of O&M foundation and building
- **WTG installation**
  - Erection of WTGs
- **Collector system and transmission line installation**
  - Installation of above and / or below ground electrical collector lines
  - Installation of on-Reserve transmission infrastructure
- **Installation of TSs**

- **Construction completion**
  - Reclamation of temporary construction areas
  - Demobilization of construction works
- **Power connection and commissioning**

2.5 Operations Phase

The HIWEC will be designed to operate for 30+ years; however, it is not uncommon for well-maintained facilities to extend beyond this design life. With the exception of routine and unplanned maintenance, it is expected that operation of the HIWEC will be 24 hours a day, seven (7) days a week. The HIWEC will be controlled and monitored remotely 24 hours a day via computer, with a team of locally based WTG technicians conducting routine maintenance and repairs. Operation is anticipated to require up to 15 trained technical and administrative staff, including WTG maintenance technicians and a site supervisor.

The operations and maintenance phase may consist of the following key activities:

- **HIWEC operation**
  - WTG operation
  - Meter calibrations
  - Met tower data acquisition
- **WTG, collector system, road and crossing repair / maintenance**
  - Preventative and unplanned maintenance of HIWEC components (includes accessing such components)
  - Maintenance of the collector system and any on-Reserve transmission lines (includes accessing such components)
  - Access road maintenance
- **Environmental monitoring**

The safe operation of the proposed HIWEC will involve the real-time collection of a series of operations parameters, including: wind speed, wind direction, air temperature, atmospheric pressure and electrical parameters. This real-time monitoring of WTG functioning is essential to reduce unplanned outage events and duration by detecting early changes to WTG performance. To provide accurate on-site monitoring of climatic conditions, four (4) Met towers up to 100 m tall were installed for the HIWEC. An additional Sonic Detection and Ranging (SODAR) unit has also been installed adjacent to one (1) Met tower to supplement meteorological data collected from the tower. Nacelle-mounted meteorological data collection points will be located such that no WTG will be located further than 5 km from the nearest data collection point.

If temperature and humidity conditions result in ice formation on WTG blades, sensors installed on each WTG will detect ice build-up by monitoring vibrations, imbalances and generation efficiency. If an event occurs that is considered to be out of the normal operating range for a WTG, the WTG will be taken out of service immediately. Through the Supervisory Control and Data Acquisition (SCADA) system, the status of the WTG will be reported to the HIWEC operator. WTGs that have been shut down will not be re-started until a site visit has been conducted to inspect the WTG and an investigation is completed that deems the WTG safe. Operational logs will be kept by technical staff that will document HIWEC operations (including WTG shutdowns) and communications with the public and agencies.

Routine preventative maintenance activities will be scheduled at approximately six (6) month intervals with specific maintenance tasks scheduled for each interval. Scheduled maintenance activities for WTGs will include a complete

inspection of the tower and components, functionality testing, replacement of any worn parts, and lubrication of moving parts. Following all maintenance work on WTGs the area in the vicinity of the WTGs will be thoroughly cleaned to ensure continued safe operation.

WTGs are very reliable and major components are designed to operate for over 20 years. However, there is a possibility that component failure may occur despite the reliability of the WTGs fleet-wide. Most commonly, the failure of small components such as switches, fans or sensors will take the WTG out of service until the facility component is replaced. These repairs can usually be carried out by a single crew visiting the WTG for several hours. Events involving the replacement of a major component such as a gearbox or rotor are rare. If they do occur, the use of large equipment, sometimes as large as that which was used to install the WTGs, may be required.

The collector lines and TSs will require periodic preventative maintenance activities. Routine maintenance will include condition assessment for aboveground infrastructure and protective relay maintenance of the TSs, in addition to monitoring of the secondary containment systems for traces of oil. Vegetation control will be required around the collector lines and on-Reserve transmission line to prevent any damage to the lines and ensure safe operation. The vegetation is typically cleared by mechanized equipment (e.g., chainsaw / hydro axe).

2.6 Decommissioning Phase

Although the HIWEC is expected to operate for 30+ years, it could also be repowered prior to considering any decommissioning activities to extend the design life. Repowering may involve switching / upgrading gearboxes and generators, replacing WTG blades, and upgrading electrical equipment.

The decommissioning phase may include the following key activities, at the discretion of HIFN:

- **Power disconnection and decommissioning of service**
  - Disconnection of collector TSs
- **Transportation of equipment and materials**
  - On-site delivery of decommissioning vehicles and equipment
  - Removal of HIWEC components and infrastructure from site
- **Disassembly and removal of collector system components**
  - Disassembly and removal of collector TSs
  - Disassembly and removal of pad-mounted transformers
  - Disassembly and removal of above and / or below ground electrical collector lines
  - Disassembly and removal of on-Reserve transmission infrastructure
- **WTG and / or tower disassembly and removal**
  - Disassembly and removal of WTG infrastructure
  - Disassembly and removal of Met towers
- **Disassembly and removal of O&M building infrastructure**
- **Decommissioning completion**
  - Reclamation of disturbed areas (includes reclamation of access roads, as required)
  - Grading of concrete foundations
  - Demobilization of decommissioning works

The specific schedule for decommissioning will be determined at the time it is undertaken.

3. Environmental Assessment Methods

3.1 Scope of the Assessment

As the proposed 300 MW HIWEC is to be located on HIFIN I.R. #2, it is subject to the HIFN EA process under the *FNLMA* and Land Code in accordance with the HIFN EA Guidance requirements. As stated in **Section 1.3.1**, the main body of this EA document is structured similar to typical federal EA requirements while the appendices are structured similar to typical provincial requirements.

According to the HIFN EA Guidance document, the EA must consider all proposed works, undertakings, and activities related to the HIWEC, including its construction and operation. Therefore, the scope of the assessment includes the permanent and temporary components and activities described in **Section 2**.

The scope of the assessment defines the factors that are considered in the EA, which are detailed in the HIFN EA Guidance document and outlined in the following sections.

3.1.1 Factors of Assessment

As per the HIFN EA Guidance document, the focus of this EA is to assess and design the HIWEC so as to avoid, minimize, or mitigate adverse effects on the environment. To address this focus, the EA considers the following factors:

1. The environmental effects of the HIWEC, on- and off-Reserve, including the effects of malfunctions or accidents that may occur in connection with the HIWEC;
2. Measures that are technically and economically feasible that would mitigate adverse environmental effects;
3. In reference to the effects and mitigation considered in factors (1) and (2), the significance of the effects which are likely, taking into account proposed mitigation measures;
4. A follow-up program on-Reserve to verify the accuracy of the HIWEC EA and determine the effectiveness of any mitigation measures;
5. Comments from the HIFN community and the public on the HIWEC EA that are received in accordance with the consultation process identified in the HIFN EA Guidance document;
6. Potential environmental effects of the HIWEC that may overlap with potential environmental effects of the off-Reserve Transmission Line;
7. Potential overlapping environmental effects of accidents and malfunctions from the HIWEC and off-Reserve Transmission Line;
8. Cumulative environmental effects that are likely to arise from the combination of (i) the HIWEC, the off-Reserve Transmission Line, and their overlapping effects, and (ii) other projects and activities that have occurred or are reasonably foreseeable;
9. Measures that are technically and economically feasible that would mitigate adverse cumulative environmental effects;
10. In reference to the effects considered in factors (6)-(9), the significance of the cumulative effects which are likely, taking into account proposed mitigation measures;

11. Recommendations for monitoring and follow-up programs to verify the accuracy of the overlapping effects that are on-Reserve and determine the effectiveness, on-Reserve, of any mitigation measures proposed to address overlapping effects; and
12. Comments from HIFN and the public on overlapping or cumulative effects that are received in accordance with the consultation processes identified in HIFN EA Guidance document.

In addition to the above mentioned factors, the EA also considers:

- Nishshing Aki (see definition below) identified through Aboriginal traditional knowledge of HIFN; and
- Comments from the public, local municipalities, government agencies and other stakeholder / interest groups on the HIWEC that are received in accordance with the consultation processes identified in the HIFN EA Guidance document.

The environmental effects, mitigation measures, significance of effects and a follow-up program for the Transmission Line are included in **Volume B**.

To focus the assessment on what is most relevant in the environment, Nishshing Aki and valued ecosystem components (VECs) have been identified. Nishshing Aki is defined as an existing social or cultural feature or condition that has been (i) identified as valued by HIFN, or (ii) designated as valued by HIFN with community input as provided in the Land Code; these are listed in **Table 3-1**. VECs are defined as existing components of the environment that have recognized ecological value in existing science, law, or policy. The VECs that were examined in the assessment process include both biophysical and socio-economic components and are also listed in **Table 3-1**. A description of how the VECs were selected is provided in **Section 3.2.3**.

Table 3-1: Valued Ecosystem Components and Nishshing Aki

Valued Ecosystem Components	Nishshing Aki
• Soils and Terrain • Groundwater • Wildlife and Wildlife Habitat • Vegetation and Ecological Communities • Surface Water • Fish and Fish Habitat • Species at Risk • Land and Resources Used for Traditional Purposes by Aboriginal Persons • Cultural Resources / Heritage and Archaeological Sites • Noise • Visual Landscape	• Sacred Sites • Burial Grounds • Old Settlements

In addition to VECs, the EA assesses “other components” that the HIWEC may have the potential to affect. These other components were identified based on input from HIFN, the public municipalities, government agencies, and other stakeholder / interest groups and the professional judgment of the assessment practitioners based on experience with similar projects. Other components include air quality; local residents, cottagers and businesses; recreation and tourism; and community services and infrastructure. The EA evaluates the interaction between HIWEC components and activities and the Nishshing Aki, VECs and other components.

3.1.2 Spatial and Temporal Boundaries

The spatial and temporal boundaries define the time-based and geographic limits of the assessment.

Construction footprint effects are considered within the HIWEC Location[1], which includes the location of any temporary and permanent HIWEC component described in **Section 2.2** and is shown on **Figure 2-2**. The HIWEC study area is shown on **Figure 2-1.** Local effects are considered in the HIWEC study area which includes HIFN I.R. #2 plus a 550 m buffer extending beyond the HIFN I.R. #2 boundary. The HIWEC study area is sufficient in size to include all of the HIWEC components, phases and activities. Regional effects are considered in the HIWEC regional study area which includes the HIWEC study area as well as the adjacent Municipality of Killarney and the geographic municipalities of Henvey Township and Mowat Township. Henvey Township and Mowat Township are two (2) unincorporated townships that are part of the Parry Sound District which do not have local level governance or any local service boards that provide typical municipal services.

Biophysical effects have been assessed within the HIWEC study area, all socio-economic effects (excluding acoustic) have been assessed within the HIWEC regional study area, and all acoustic impacts have been assessed within 2,000 m of a WTG.

The temporal boundaries for each phase of the HIWEC are defined below:

- Construction Phase – May 2016 to February 2018
- Operation Phase – February 2018 to January 2048
- Decommissioning Phase – January 2048 to September 2049

Based on the timing of the phases, the overall temporal boundary for the assessment is from May 2016 to September 2049.

The above mentioned spatial and temporal boundaries are considered a minimum and some exceptions to these boundaries may apply for different VECs, components, features or effects. If any exceptions are considered for this EA, they are identified with the appropriate component in **Section 6**.

3.2 Methodology

Based on the HIFN EA Guidance document, the following steps outline the methodology for the EA:

1. Determine the location and scale of the HIWEC and all on-Reserve related undertakings and activities;
2. Determine spatial and temporal boundaries (revise if necessary, as the EA progresses);
3. Identify Nishshing Aki and VECs that have the potential to be affected;
4. Complete background data collection and baseline field studies to obtain information on the Nishshing Aki and VECs;
5. Predict the potential environmental effects of the HIWEC on the Nishshing Aki and VECs on- and off-Reserve and propose mitigation measures to address these effects;
6. Determine the residual effects of the HIWEC on the Nishshing Aki and VECs;
7. Determine the significance of residual effects of the HIWEC on the Nishshing Aki and VECs;
8. Predict the overlapping residual effects on Nishshing Aki and VECs of the HIWEC and the off-Reserve Transmission Line;
9. Determine the significance of the residual overlapping effects on Nishshing Aki and VECs;

1. *The HIWEC Location is defined as the location of any temporary and permanent HIWEC component. This includes a 160 m box around all WTGs, a 50 m buffer around all access roads, collector lines, and on-Reserve transmission lines, the TSs and the construction compounds and laydown areas. The HIWEC Location is shown on **Figure 2-2**.*

10. Determine likely environmental effects from accidents and malfunctions and the effects the environment will have on the HIWEC;
11. Predict the cumulative effects on Nishshing Aki and VECs that are likely to arise from the combination of (i) the overlapping effects of the HIWEC and the off-Reserve Transmission Line and (ii) other projects and activities that have occurred or are reasonably foreseeable;
12. Determine the significance of the cumulative effects on Nishshing Aki and VECs; and
13. Propose monitoring and follow-up plans that are required for the HIWEC and recommended for the off-Reserve Transmission Line.

3.2.1 Aboriginal Traditional Knowledge

The HIFN EA Guidance document defines Aboriginal traditional knowledge as the cumulative knowledge held by Aboriginal peoples through generations of living in close contact with nature. It encompasses cultural, environmental, economic, political and spiritual inter-relationships.

Traditional knowledge for HIFN was gathered from secondary sources, as well as through a traditional knowledge study that was conducted in 2013 related to the Highway 69 widening project. In the *Traditional Land Use Study Related to Proposed Four Lane Highway 69*, HIFN community members and groups were interviewed to provide information on historic and current land uses within the community's traditional territory (HIFN, 2013). The traditional knowledge report provided to the EA team was used internally, and in discussion with HIFN Chief and Council, to identify Nishshing Aki and VECs and establish avoidance and / or mitigation strategies.

In addition, traditional knowledge of other Aboriginal communities as well as Métis that has been made available to the EA team was taken into account in selecting VECs, assessing the impacts of the HIWEC and proposing mitigation measures.

3.2.2 Consultation Program Feedback

Consultation with HIFN Council and the community was completed at key stages in the EA process for the HIWEC and primarily included community meetings and other opportunities for community members to comment (e.g., through contact phone number / email and comment forms on the HIWEC website). Consultation with the public off-Reserve was also conducted which included separate public notices, meetings and opportunity for comment. A summary of all engagement activities throughout the EA process is included in the Consultation Report found in **Appendix I**.

All comments that were received from HIFN, the public, local municipalities, government agencies and other stakeholder / interest groups were considered in the assessment process. Where applicable, consultation activities have influenced the identification of Nishshing Aki and VECs, contributed to mitigation development, and provided feedback to improve the consultation process.

3.2.3 Selection of Nishshing Aki and Valued Ecosystem Components

As described in **Section 3.1.1**, the Nishshing Aki and VECs were identified to focus the assessment on what is most relevant in the environment to HIFN and to guide the information that was collected as part of the review of existing environmental conditions. The Nishshing Aki is identified in the HIFN EA Guidance document and refers to an existing social or cultural feature or condition on HIFN I.R. #2 lands that has been identified as valued by HIFN or designated as valued by HIFN with community input and must be protected.

In addition to the Nishshing Aki, to ensure a comprehensive review of the potential environmental effects of the HIWEC, HIW considered the following items when developing the VECs:

- Input from HIFN;
- Federal and provincial law and guidance; and
- Any other source HIW considered to be relevant, such as scientific or academic publications, or input from the public.

A full list of VECs, as well as their interactions with HIWEC components and activities, is provided in the HIWEC-Environment Interactions Matrix found in **Section 6.1**.

3.2.4 Potential Effects and Proposed Mitigation

Potential environmental effects of the HIWEC are determined by assessing the interaction of components and activities of the HIWEC with Nishshing Aki and VECs based on existing environmental conditions.

Mitigation strategies are proposed to address potential adverse environmental effects. The HIFN EA Guidance document defines mitigation as the elimination, reduction, or control of any adverse environmental effect which can also include restitution for any damage caused by such effects through replacement, restoration, compensation, or other means. Proposed mitigation strategies are developed based on federal and provincial law and guidance, industry best practices and previous experience on similar renewable energy projects.

The potential environmental effects and the proposed mitigation measures for the HIWEC are included in **Section 6**.

3.2.5 Residual Effects and Evaluation of Significance

Residual effects are those environmental effects that are likely to occur, even after proposed mitigation measures are in place. The main purpose of the EA is to assess and design the proposed HIWEC so as to avoid or minimize significant residual adverse environmental effects. In order to assess the significance of residual adverse environmental effects, the following criteria are used:

- Magnitude: is the effect inconsequential, minor, moderate, or major?
- Spatial Extent: is the effect confined to a small area around a physical work or activity, a larger area within property boundaries, an area beyond property boundaries but confined to Crown land, or a larger area?
- Duration and Frequency: is the effect short-term, medium-term, or long-term? Infrequent, frequent, or continuous?
- Permanence: is the effect reversible?
- Context: is the effect upon a common feature or a sensitive feature?

These criteria are further defined in **Table 3-2**. To assist in determining significance, the degree of effect is also defined in **Table 3-2**. Once the degree of effect is understood, significance can be determined. The final determination of significance is based on weighing all criteria and identifying the likelihood of the effect occurring. The significance of residual effects is assessed based on professional judgement as well as previous experience on similar projects. Only likely residual adverse effects are advanced for an assessment of significance, whereas positive effects are not carried forward for further consideration.

Table 3-2: Residual Effects Significance Criteria and Levels

Residual Effects Criteria	Effects Level Definition		
	Minor	*Moderate*	*Major*
Magnitude	Effect is inconsequential or is a minor change compared to existing conditions.	Effect exceeds existing conditions, but is less than federal or provincial regulatory criteria or published guideline values.	Effect exceeds federal or provincial regulatory criteria or published guideline values.
Spatial Extent	Effect confined to sites within construction footprint including temporary and permanent facilities.	Local effect within and / or near the HIWEC and Transmission Line study area.	Regional effect.
Duration and Frequency	Effect is evident only during one (1) HIWEC phase (e.g., construction and operations) and occurs infrequently for short durations.	Effect is evident during more than one (1) phase HIWEC phase (e.g., construction and operations) and occurs infrequently or frequently for short durations.	Effect is evident during more than one (1) HIWEC phase (e.g., construction and operations) and occurs frequently for long durations or continuously.
Permanence	Effect is readily reversible over a short period of time (e.g., one (1) growing season).	Effect is not readily reversible during the life of the HIWEC.	Effect is permanent.
Context	Effect is on a common feature.	Effect is on a sensitive feature that is common.	Effect is on a sensitive feature that is not common.

Based on the criteria in **Table 3-2**, the EA identifies one (1) of the following conclusions for each adverse environmental effect:

1. Without any mitigation, the effect is not significant;
2. After applying identified mitigation, the effect is not significant;
3. After applying identified mitigation, the effect is significant; or
4. The significance of the effect is uncertain.

In addressing conclusions (1) to (3), the standard is not certainty, but likelihood. The EA Report addresses the uncertainty of any adverse effect consistent with the precautionary principle[2].

The residual effects and evaluation of significance are provided in **Section 6**.

3.2.6 Overlapping Effects

After completing the separate assessments of environmental effects from the HIWEC and the off-Reserve Transmission Line the next step is to identify and assess their overlapping environmental effects for significance. This includes adding the residual environmental effects of one to the residual environmental effects of the other, and assessing the adverse environmental effects of the combined impact of the HIWEC and the Transmission Line where they are acting on the same Nishshing Aki or VEC. Since the HIWEC and the Transmission Line are being reviewed under separate EA processes, looking at the overlapping effects of the two (2) proposals together provides HIFN Band Council with an understanding of the combined effects of the HIWEC and the Transmission Line. The overlapping effects also provide a baseline for assessment of cumulative effects with other projects and activities.

2 *"Precautionary principle" means where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.*

This step of the assessment is documented in **Volume C** and includes a description of the potential overlapping environmental effects, proposed mitigation measures and the significance of the residual adverse environmental effects.

3.2.7 Cumulative Effects

In addition to identifying the overlapping effects of the HIWEC and the off-Reserve Transmission Line, the EA also assesses cumulative environmental effects. The cumulative environmental effects are determined by assessing the combined effects of the on- and off-Reserve components with other past, present and reasonably foreseeable future projects and activities.

This step of the assessment is documented in **Volume C** and includes a determination of potential cumulative environmental effects, proposed mitigation measures and the significance of the residual adverse environmental effects.

3.2.8 Proposed Monitoring and Follow-up Plans

Monitoring and follow-up programs are developed in conjunction with proposed mitigation measures for potentially adverse environmental effects (including overlapping and cumulative effects), as applicable. These programs will allow HIW to determine the effectiveness of the proposed mitigation measures, and verify the accuracy of the EA predictions. During construction and operations monitoring, if adverse environmental effects are determined to be more severe than predicted or if mitigation is less effective than planned, the measures included in the monitoring and follow-up programs will serve as early warning signals that will allow HIW to implement remedial measures in a timely manner, as required.

The proposed monitoring and follow-up plans are provided in **Section 8**.

4. Existing Environment

4.1 Biophysical Environment

4.1.1 Geophysical Environment

4.1.1.1 Soils and Terrain

4.1.1.1.1 Physiography and Topography

The HIWEC study area lies within the Georgian Bay Fringe physiographic region, as defined by Chapman and Putnam (1984). The Georgian Bay Fringe is characterized by a gentle plain that inclines gradually from the shoreline of Georgian Bay to the Algonquin Highlands, the region that runs approximately north-south along its eastern boundary. Although relief within the Georgian Bay Fringe is generally considered to be low (i.e., less than about 15 m), numerous bare rock knobs and ridges occur which rise above the local ground topography. The character of the land surface across the region is dictated by the irregular bedrock surface that underlies a thin, discontinuous blanket of overburden. Steep-walled valleys and bedrock-controlled features are observed to trend generally northeast – southwest and are dictated by the fault and fracture network prevalent in the bedrock. Ground elevations within the HIWEC study area generally decline in a southwest direction from a topographic high of approximately 213 m Above Sea Level (mASL) in the southeast portion of the HIWEC study area to a low of about 169 mASL in the northeast and along the shoreline of Georgian Bay (**Figure 4-1**).

4.1.1.1.2 Overburden Geology

4.1.1.1.2.1 Quaternary Geology

Very little overburden is present within the HIWEC study area. Exposed, frequently weathered and fractured bedrock accounts for much of the surficial geology, with the remainder being characterized by organic deposits which accumulated in low-lying areas and bedrock valleys as well as a bedrock-drift complex consisting of a thin, discontinuous veneer of glaciolacustrine sand and/or gravel, isolated occurrences of ice-contact stratified sands and gravels, and of loose, stony glacial till (Ontario Geological Survey (OGS), 2003). Where present, the thickness of the overburden generally is less than about 1 m; however, with slightly thicker accumulations of up to 3 m being found in bedrock hollows, topographic lows, and on the lee-side of bedrock knobs in relation to the direction of glacial ice-flow.

The past glacial history of the region is better described through observations of erosional bedrock features such as striae, chattermarks, and roches moutonees. The deposited drift and bedrock erosional features represent the final Late Wisconsinan glacial advance and retreat (Kor, 1989). The following is a description of the quaternary geological deposits found within the HIWEC study area.

Ice-Contact Stratified Deposits and Till

Ice-contact stratified deposits occur in a narrow linear bedrock-controlled valley in the northeastern portion of the HIWEC study area (**Figure 4-2**). This deposit is described by Kor (1989) as rippled, cross-bedded, medium- to coarse-grained sands and fine gravels that are interbedded with loose stony diamict flows.

The till is of a loose sandy to silty sand texture and contains sub-angular clasts derived from local rock types. This deposit was observed by Kor (1989) in protected bedrock hollows and was associated with the ice-contact stratified deposits. Kor (1989) suggests this till may have been more extensively deposited, but was removed by glacial meltwaters.

Figure 4-1: Topography

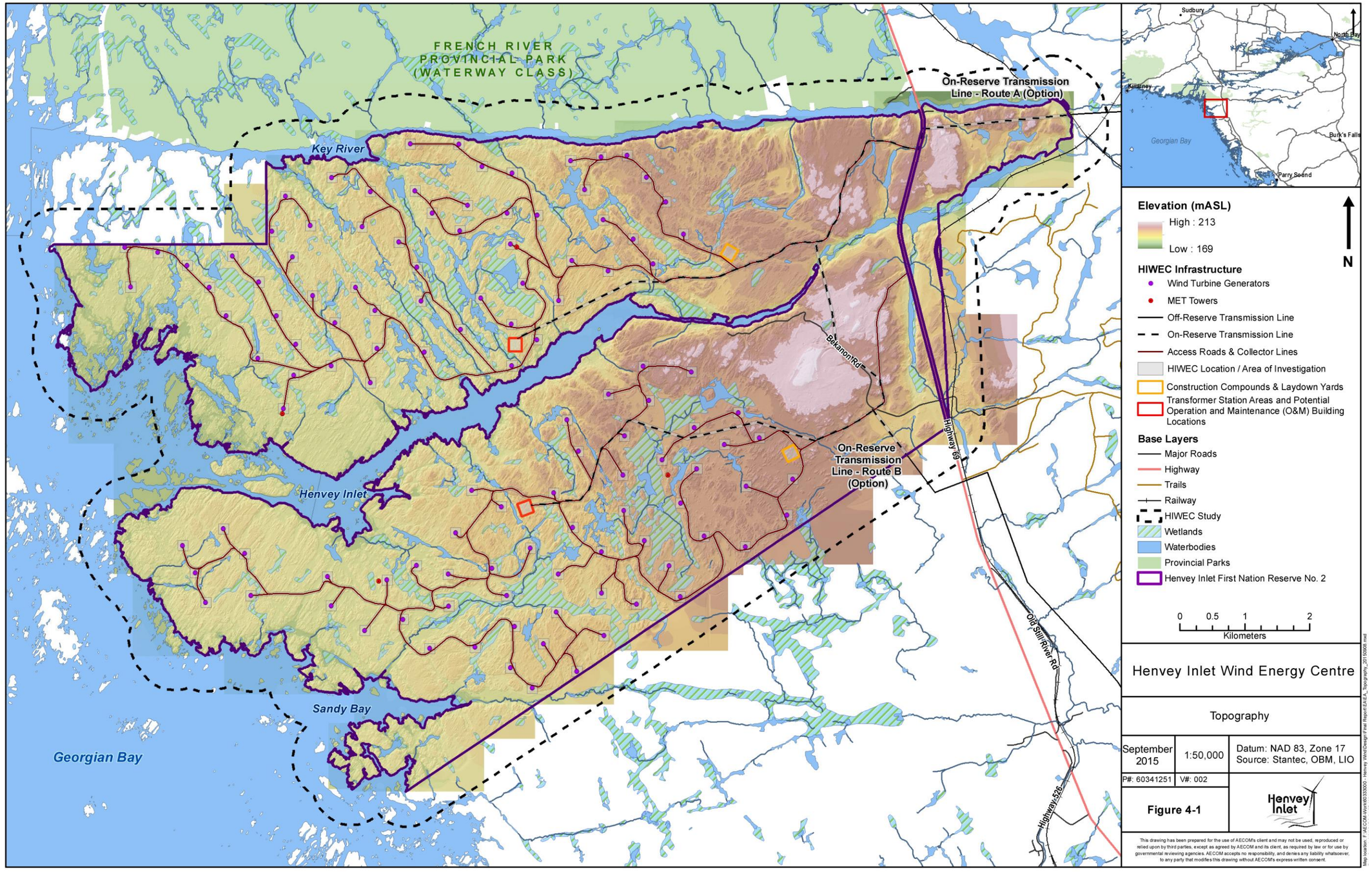
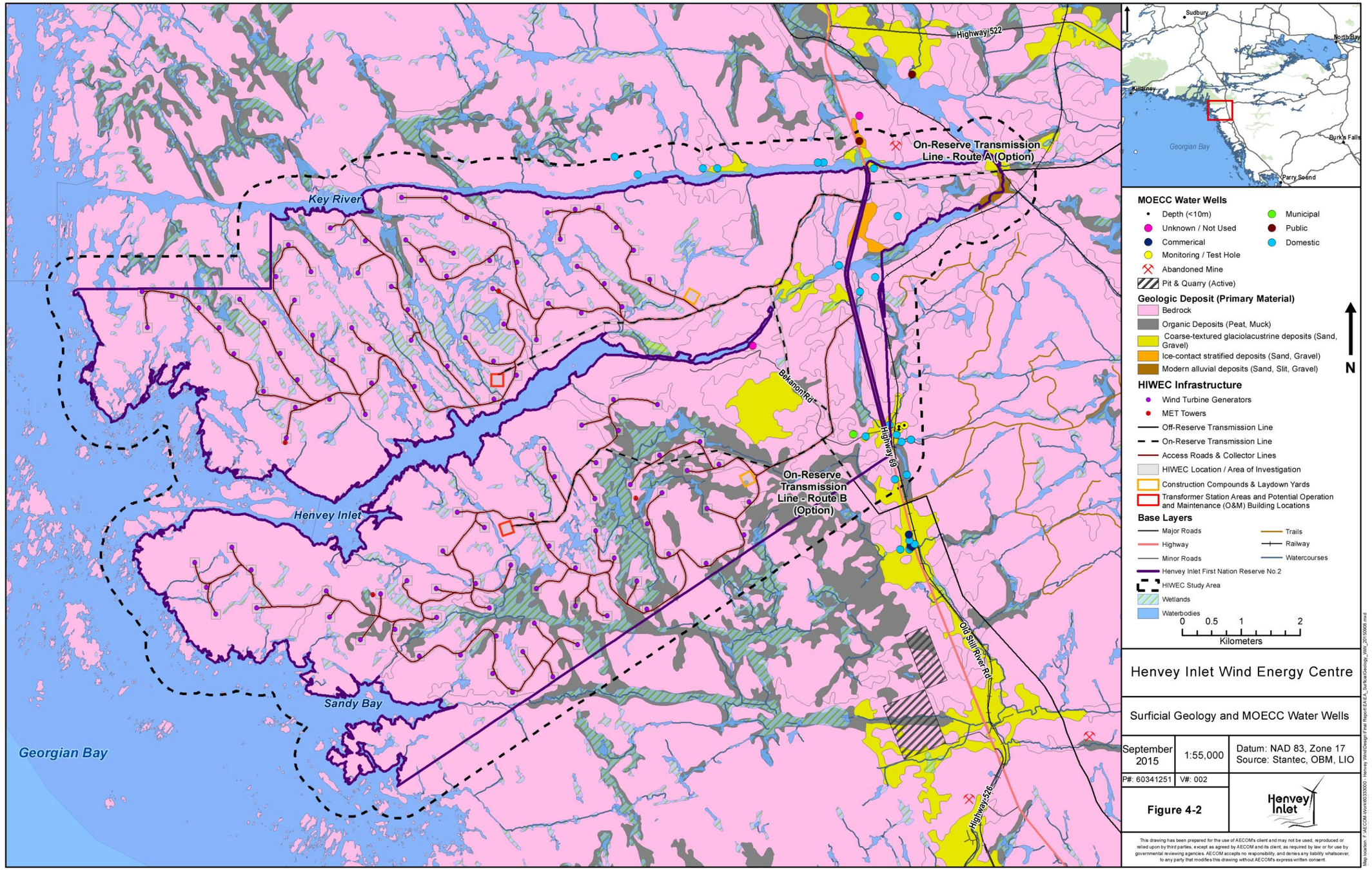


Figure 4-2: Surficial Geology and MOECC Water Wells



Glaciolacustrine Deposits

Glaciolacustrine sands and gravels were deposited during the time when the HIWEC study area was submerged by glacial Lake Algonquin. Thicker, more continuous deposits of glaciolacustrine sediments are mapped within the eastern portion of the HIWEC study area and along the existing Highway 69 corridor to the east. These deposits are generally characterized by a coarsening-upward sequence of laminated silts and clays overlain by stratified sand and some gravel, having a maximum thickness of about 4 m within the HIWEC study area (Kor, 1989). Glaciolacustrine sands and gravels are also present within east-west trending narrow bedrock valleys throughout the Parry Sound region.

Glaciofluvial Deposits

Glaciofluvial deposits do not occur within the HIWEC study area in mappable quantities. Minor amounts of sand and gravel were observed overlying glaciolacustrine deposits, indicating drainage during phases of glacial lake decline (Kor, 1989).

Recent Deposits

Recent deposits, swamps and organic deposits are common within the HIWEC study area and are present in low-lying areas and bedrock hollows. These areas commonly exhibit poor drainage and associated marsh-like characteristics.

4.1.1.1.2.2 Soil Survey

Soil survey reports published by Agriculture and Agri-Food Canada had not been completed for the HIWEC study area at the time of this EA. Available landform and geology terrain mapping published by the Ontario Geological Survey indicates that the majority of the HIWEC study area is classified as a peat and muck organic terrain within a mainly bedrock terrain with low local relief (Mollard, 1981). Soils associated with the large wetland complex in the southern portion of the HIWEC study area are classified mainly as organic within a bedrock terrain possessing low local relief and knobby secondary relief. The soils within this area are designated as mainly wet. The southeastern portion of the HIWEC study area, and along Highway 69, is mapped as bedrock below a veneer of glaciolacustrine sand delta. The soils within this area are described as being mixed wet and dry (Mollard, 1981).

4.1.1.1.3 Erosion and Sedimentation

Soil erosion is the gradual wearing away of the land surface by water, wind, ice and gravity. The transportation, deposition and accumulation of soil is known as sedimentation. Erosion is influenced primarily by four (4) factors: climate, soil type, topography and vegetation. Rainfall is the major climatic factor which contributes to erosion. It causes erosion in two (2) ways: by raindrop impact and by runoff. Although the amount and intensity of rainfall are critical parameters affecting erosion, the seasonal distribution is often more critical. The season of heaviest erosion is characterized by a combination of the most unstable ground condition and the most intensive rainfall. In the HIWEC study area, this occurs in the spring and fall.

The rate of soil erosion may be influenced by landscape, rainstorm characteristics, cover and soil management, and soil type. Soil erodibility tends to increase with a greater content of silt and very fine sand and decrease with a greater content of coarse sand, clay and organic matter. Within the HIWEC study area, little overburden is present and exposed bedrock accounts for much of the surficial geology with the remainder being characterized by organic deposits which have accumulated in low lying areas and bedrock valleys as well as a bedrock drift complex consisting of a thin, discontinuous veneer of glaciolacustrine and glaciofluvial sand and / or gravel and isolated occurrences of ice-contact stratified sands and gravels (OGS, 2003). The thickness of overburden is generally less

than about 1 m across the HIWEC study area with slightly thicker accumulations of up to 3 m being found in bedrock hollows, topographic lows and on the lee-side of bedrock knobs in relation to the direction of glacial ice-flow.

The lengths and steepness of slopes affect the velocity of runoff water, and therefore are the principal surface features affecting erosion on a site. Chapman and Putnam (1984) delineate the HIWEC study area as being within the Georgian Bay Fringe physiographic region which is characterized by a gentle plain that slopes up gradually from the shores of Georgian Bay to the Algonquin Highlands region. Although relief in the Georgian Bay Fringe is generally considered to be low, numerous bare rock knobs and ridges occur which rise above the local ground topography. Due to the absence of overburden material on these topographic highs, minor amounts of sediment are expected to be eroded due to topography.

4.1.1.1.4 Bedrock Geology

The HIWEC study area is situated within the western portion of the Central Gneiss Belt, which comprises the southwestern part of the Grenville Province of the Canadian Shield. The Grenville Front Tectonic Zone lies to the north of the HIWEC study area, and the Central Metasedimentary Belt lies to the south. The Central Gneiss Belt is composed of a complex suite of strongly foliated gneissic and migmatitic rocks of Early to Middle Proterozoic age (Kor, 1991). The Central Gneiss Belt has been further divided into separate lithotectonic domains and sub-domains, each separated by zones of intense metamorphism and based on distinct changes in geological, geophysical, and structural characteristics (Kor, 1991, Davidson *et al.*, 1982). The HIWEC study area is located within the Britt Domain which occupies the eastern shoreline of Georgian Bay north of Parry Sound. The Britt Domain is characterized by a complex of highly deformed layered, migmatitic gneisses of granitic to granodioritic composition that range from pinkish-grey to greyish white in colour and exhibit strong foliation (Bright, 1989). Mineral assemblages correspond to that of the mid- to upper amphibolites facies (Davidson and Morgan, 1981). Biotite gneiss and quartzofeldspathic gneiss are also present. These units are intruded by metamorphosed felsic to intermediate plutonic rocks consisting of massive to foliated monzogranitic to granitic orthogneiss, and a sequence of mafic dikes composed of amphibolite and gabbroic orthogneiss. The suite of metamorphic rocks within the area is intruded by late, unmetamorphosed pegmatitic granite dykes (Bright, 1989).

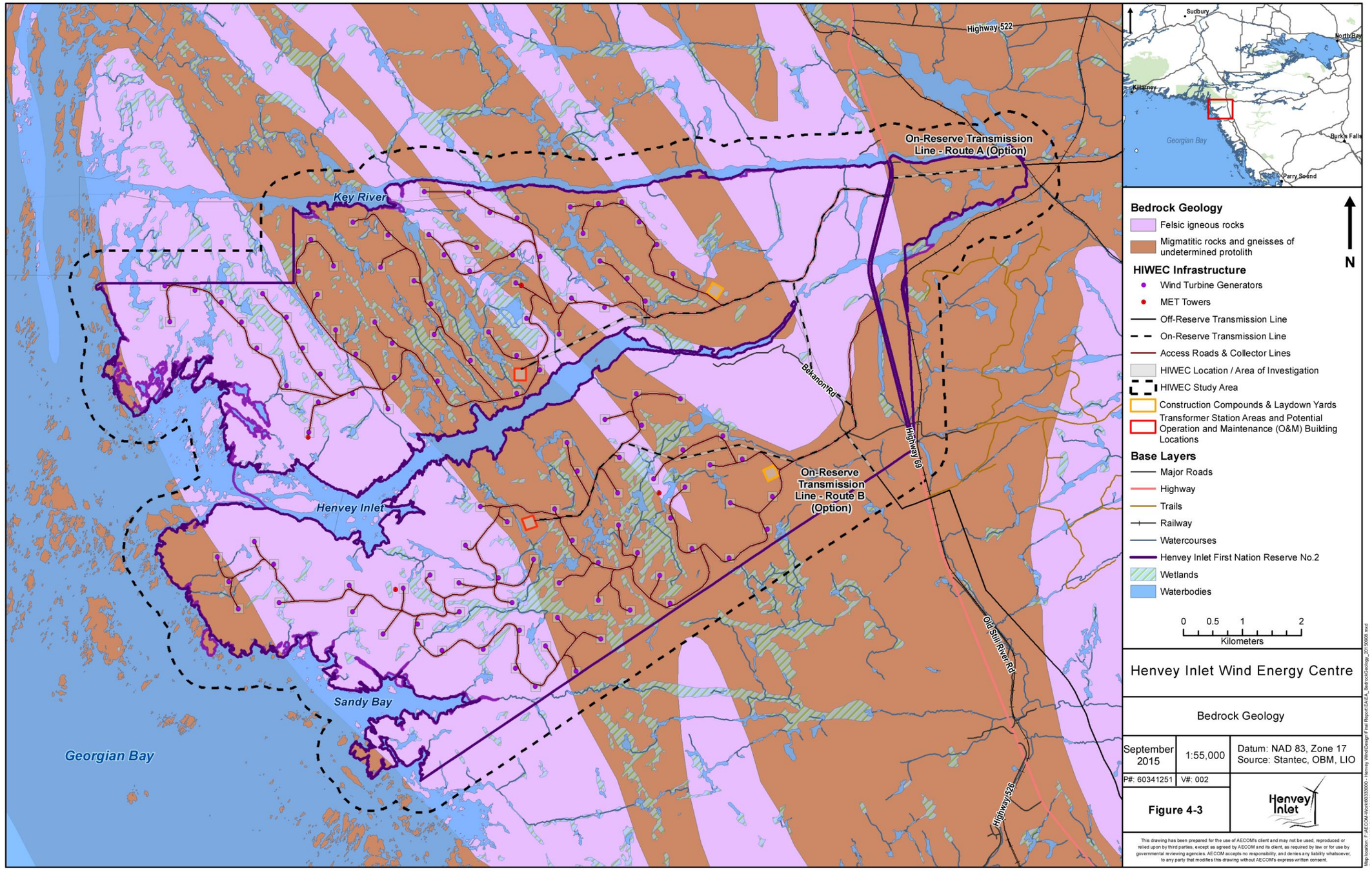
The HIWEC study area is situated over a folded assemblage of gneissic rocks of the Key Harbour Gneiss Association and intermediate to felsic intrusives (Culshaw *et al.*, 2004a). The Key Harbour Gneiss Association is mapped within the central portion of the HIWEC study area and is characterized by intermediate to felsic leucocratic gneiss, and layered metasedimentary rocks of pink to grey quartz-feldspar-biotite paragneiss. Rocks of the Key Harbour Gneiss Association within the HIWEC study area are mapped as a single unit in **Figure 4-3** due to their similarity in age and generally more mafic composition when compared to the younger, more felsic intrusives.

A later suite of intermediate to felsic intrusive rocks is mapped throughout the HIWEC study area, and becomes more prevalent in the western half of the HIWEC study area. These are characterized by weakly foliated to gneissic grey-coloured hornblende-biotite granodiorite, locally containing potassium feldspar megacrysts, minor tonalite, pink granite, and grey granodiorite (Culshaw *et al.*, 2004b).

4.1.1.1.5 Seismicity

Seismic hazard is quantified by determining the probability of expected ground motion within an area. The Geological Survey of Canada (GSC) is responsible for evaluating regional seismic hazards and preparing seismic hazard maps based on statistical analysis of past earthquakes and from knowledge of Canada's tectonic and geological structure. The National Building Code uses seismic hazard maps and earthquake load guidelines to design and construct buildings to be as resilient to earthquake damage as possible. According to the 2010 Seismic Hazard Map, prepared by the GSC (2015), the HIWEC study area is situated within a low relative hazard area.

Figure 4-3: Bedrock Geology



4.1.1.5 Groundwater

4.1.1.5.1 Hydrostratigraphy

Within the Canadian Shield, two (2) separate groundwater systems are identified: i) a shallow, freshwater system that extends to at least 150 m depth, and ii) a deep saline system that extends down hundreds of metres (Singer and Cheng, 2002; Thorne and Gascoyne, 1993). Groundwater within the shallow freshwater system of the Canadian Shield serves as a source of drinking water for many residents within the Canadian Shield. Geological materials that host and transmit groundwater can be subdivided into two (2) distinct groups based on their ability to allow groundwater movement; namely aquifers and aquitards. Aquifers are classically defined as a geological unit permeable enough to permit a useable supply of water to be extracted, and aquitards are relatively impermeable units that inhibit groundwater movement. The exposed bedrock of the Central Gneiss Belt within the region is highly fractured within the upper 10 to 20 m (Sykes *et al.*, 2009; Ecoplans Limited, 2007), making it an aquifer unit. It is the secondary permeability created by these fractures that dictate the ease at which groundwater is able to move through the bedrock aquifer, and the intensity and distribution of fractures determines the total porosity, hydraulic conductivity, and infiltration rate within the Precambrian bedrock aquifer (Singer and Cheng, 2002).

Within the HIWEC study area, the pattern of fractures in the bedrock aquifer allows for movement of groundwater, however, this secondary permeability generally decreases with depth (Sykes *et al.* 2009). Overburden deposits, such as the glaciolacustrine sands are also considered aquifer units; however, as mentioned in **Section 4.1.1.1.2**, these units are thin and discontinuous and thus are not considered to be significant, although they may be hydraulically connected with the underlying Precambrian bedrock aquifer (Singer and Cheng, 2002). The primary aquifer within the HIWEC study area is within the upper fractured bedrock.

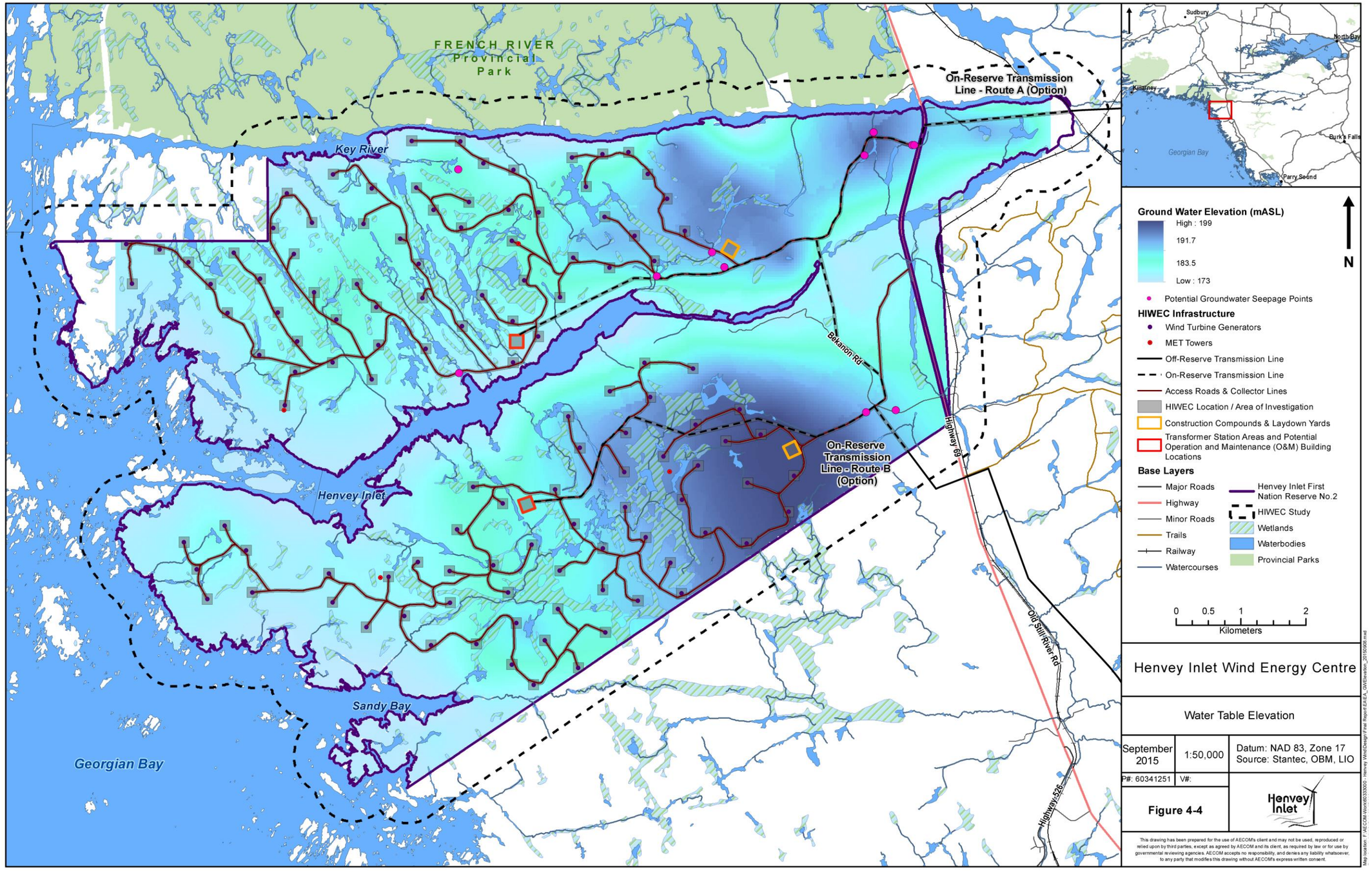
The fundamental characteristics of fractured rock aquifers are the extreme variability in hydraulic properties, such as conductivity and flow direction. In a fractured rock setting, groundwater flows may be extremely high through discrete fractures or faults, creating a defined flow zone. In a purely fractured media, such as in crystalline bedrock environments, groundwater flow in the host rock between these fractures and faults is extremely low and is considered a confining unit.

4.1.1.5.2 Groundwater Recharge and Discharge

Recharge is the term used to describe downward flowing groundwater, that is, from the ground surface toward the water table. Discharge is defined as the movement of groundwater such that the water table intersects the ground surface. Within the Canadian Shield, recharge and downward groundwater movement occurs in topographically high regions, such as the Algonquin Highlands to the east of the HIWEC study area or more locally on bedrock knobs and ridges. Discharge and upward groundwater flow occurs in topographic lows, such as Henvey Inlet or within bedrock valleys and isolated topographic depressions between bedrock knobs (**Figure 4-1**). Throughflow, sub-parallel to ground surface, occurs in areas of low topographic relief at moderate elevations (Sykes *et al.*, 2009). A significant component of the HIWEC study area can be classified as a recharge area due to the dense, interconnected fracture network at surface.

Water table elevation for the HIWEC study area was interpolated from topographic information and validated by groundwater level information provided in the URS (2014) Hydrogeological Assessment Report. For the purpose of this desktop study, the water table is assumed to be directly connected to local surface water features within the HIWEC study area. By means of a geographic information system (GIS) mapping technique, a water table elevation map was prepared using surface water elevation as a point source for water table elevation information (**Figure 4-4**). The resulting water table elevation map indicates a potential groundwater discharge zone in the vicinity of Henvey Inlet and within the western portion of the HIWEC study area. Groundwater seeps and springs were observed during the ecological field investigation by AECOM and locations are presented on **Figure 4-4**.

Figure 4-4: Water Table Elevation



4.1.1.5.3 Groundwater Flow

Groundwater flow is the result of differences in hydraulic head or, simply stated, water table elevation, from one (1) location to another. Regional groundwater flows from east to west into Georgian Bay. Topographic lows, such as river valleys, can have local effects on the direction of groundwater movement. Groundwater flowpaths frequently bend into river valleys and isolated topographic depressions; examples within the HIWEC study area include Henvey Inlet, Key River, and some of the deeper bedrock hollows and valleys within the lowlands.

Water table contours have been shown to subtly reflect the topographic contours in the region, emphasizing the influence of topography on the shallow groundwater flow system. As illustrated on **Figure 4-4** groundwater flow within the HIWEC is primarily from east to west, except within the central portion of the HIWEC study area, where groundwater likely flows towards Henvey Inlet.

4.1.1.5.4 Water Well Survey

An inventory of private water wells (i.e., domestic, commercial, industrial, etc.) was performed within a radius of approximately 1,000 m from the HIFN I.R. #2 boundary, by means of searching the Ontario Ministry of the Environment and Climate Change (MOECC) Water Well Database. The northern limit of the water well survey area was truncated at the Key River as this feature would serve as a hydrogeological divide between the HIFN I.R. # 2 boundary and those lands to the north. Results are shown in **Figure 4-2**, along with the primary use of each well. A total of 28 water well records were found located within the 1,000 m search area radius, of which only six (6) are located within the HIFN I.R. #2 boundary. A review of the water well records indicates that the majority (88%) of wells are completed in bedrock and range in depth between about 3.1 and 79.2 m. Two (2) of the located wells are reported to be completed in overburden material (sand) and are located on the north side of Key River, outside of the HIWEC study area.

As shown in **Table 4-1**, available well records indicate that 61% of groundwater use within the 1,000 m search area radius is for domestic purposes, followed by commercial use (11%), and public and municipal supply use (11%). Approximately 18% of MOECC water well records specified the primary use as ‘Not Used’ or ‘Monitoring and Test Hole’, which indicates those wells are not used as a groundwater supply.

Table 4-1: Summary of MOECC Water Well Records

Primary Well Use	Number
Commercial	3
Domestic	17
Monitoring and Test Hole	3
Municipal	1
Not Used	2
Public	2
Total	**28**

A detailed door-to-door water well survey was performed by AECOM on June 8th and 9th, 2015. The purpose of the well survey was to collect hydrogeological data and well construction details for actively used groundwater supply wells within the 1,000 m search area radius to the east and south of the HIFN I.R. #2 boundary and bounded by Georgian Bay to the west and Key River to the north as previously mentioned. The 1,000 m search area radium was not extended to the north of the HIFN I.R. #2 boundary as hydrogeological impacts are not anticipated across the Key River. The well survey was performed from publically accessed roads and / or by boat along Henvey Inlet and Key River. The well survey included a detailed questionnaire regarding pertinent water well information such as: contact information; well location; past water quality concerns; well construction details; well depth; pump setting details; historic and current water usage; and water treatment system details. In instances where the

property owner was not available at the time of our survey, an information package, including a brief covering letter, a copy of the survey form and a pre-addressed and stamped envelope for return mailing to AECOM, was left at the front door. A sample copy of the survey information package is provided in Appendix A of the Hydrogeological Assessment and Effects Assessment Report included as **Appendix J**.

During the survey, a total of 51 private residences were identified. Of those 51 residences, 15 property owners / tenants were interviewed, and 26 were not available at the time. As noted previously, an information package was left in a highly visible location at the front door at each location where the property owner was not home. Ten (10) property owners / tenants were unable to provide information about their water supply or did not wish to participate in the well survey. One (1) property owner / tenant responded to the information package left at the property. **Figure 4-5** illustrates the private residences in which a well survey was conducted.

Results of the well survey indicate the presence of 18 private groundwater supply wells, of which 20 private residences source water. Four (4) property owners / tenants share a communal well located on Bekanon Road and one (1) residence has two (2) wells located on the property. Of the 18 wells identified, six (6) shallow dug wells, presumably completed in overburden, were identified. The remaining 12 wells were drilled wells most likely completed in bedrock. Results of the survey are summarized and included in **Appendix J** and illustrated on **Figure 4-5**.

4.1.1.5.5 Water Taking Assessment

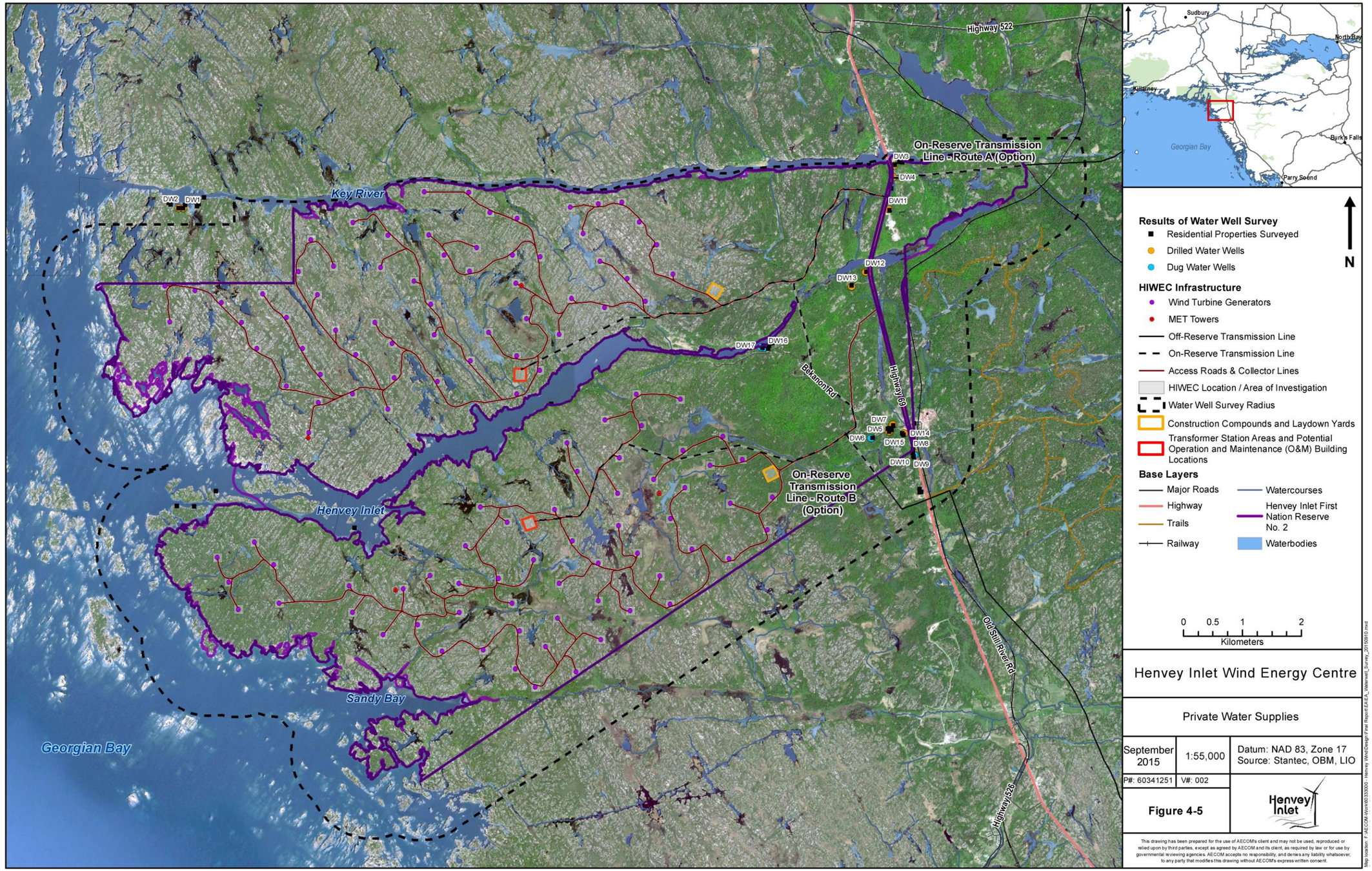
To identify potential effects from construction or operation of the HIWEC on groundwater quality, quantity or movement, a hydrogeological assessment was conducted to:

- Assess potential water-taking requirements during the construction phase;
- Assess the potential for WTG foundations and any associated buried services to alter or change shallow groundwater flow patterns and the potential impact on local wells, or ecological features (wetlands or streams); and
- Assess long-term water-taking requirements during the operation phase.

4.1.1.5.5.1 Construction Phase Water Takings

Water-taking requirements during the construction phase may include dust suppression and drilling fluids. Water requirements for the purpose of dust suppression are expected to have peak water demands up to 40,000 litres per day (L/day). The proposed source of water for dust suppression may be a local surface water intake, excluding federally regulated waters (Georgian Bay, Henvey Inlet and Key River) or one (1) or more new groundwater supply well(s) located at the Transformer Station Areas (TSA) and the O&M building. Water may be required during drilling operations to facilitate the installation of rock anchors as part of the WTG foundation construction. At the time the EA Report was prepared, construction methodologies and WTG construction sequencing had not been finalized. Estimates for water requirements for the construction of WTG foundations have been estimated based on the assumption that ten (10) WTG foundations will be constructed simultaneously, with three (3) drill rigs operating at each location. Approximately 4,000 litres (L) of water will be required to facilitate one (1) rock anchor installation, resulting in a daily water requirement for the HIWEC of approximately 120,000 L/day. Actual daily demands will vary based on day-to-day operations and will typically be lower in volume than the estimated peak volume. The proposed source of water for general construction use will be one (1) or more future groundwater supply well(s) located at the TSAs and the O&M building.

Figure 4-5: Private Water Supplies



4.1.1.5.5.2 Groundwater Dewatering Requirements

Review of existing secondary source information provided by the Ontario Geological Survey and through the analysis of local MOECC water well records indicates that groundwater takings for the purpose of WTG foundation dewatering is expected to occur at WTG locations where the water table is expected to be less than 4 m from ground surface. Comparing groundwater elevation (**Figure 4-4**) and ground surface elevation (**Figure 4-1**) by means of a GIS mapping technique the approximate depth to the water table within the HIWEC study area was determined. WTGs located in areas where the water table is less than 4 m from ground surface is expected to require groundwater taking during the construction of the WTG foundation to maintain a dry working environment. Based on these results, it is anticipated that 68 WTG locations are located in areas where the groundwater table is anticipated to be less than 4 m below ground surface. A complete list of WTGs with potential groundwater taking requirements is presented in **Appendix J**.

4.1.1.5.5.3 Long Term Water Takings and Operation Considerations

During operation of the HIWEC, full time employees will work in the O&M building. Non-potable water taking during operation will be limited to regular personnel requirements, which are expected to be approximately 4,500 L/day and are not expected to exceed 50,000 L/day. Facilities that will provide this non-potable water will require the construction of one (1) or more new well(s) at the O&M building.

4.1.2 Atmospheric Environment

4.1.2.1 Climate

The HIWEC study area is located within the Georgian Bay Ecoregion, situated on the southern portion of the Precambrian Shield in south-central Ontario. The climate of this ecoregion is cool-temperate and humid, and falls within the Humid High Moderate Temperature Ecoclimate Region. The mean annual temperature range is between 2.8 to 6.2°C, and the mean length of growing season is between 183 to 219 days. The mean summer rainfall is between 204 and 304 millimetres (mm), with annual precipitation ranging between 771 and 1,134 mm (Crins *et al*., 2009).

Monthly climatic statistics for the HIWEC study area were derived from EC's nearest long-term monitoring station, Monetville, Ontario, as shown in **Table 4-2**. The Monetville, Ontario station is located approximately 30 km northwest from the HIWEC study area (EC, 2015a).

Table 4-2: Monthly Average Climatic Statistics for Monetville, Ontario (1981-2010)

Monetville, Ontario[1]					
Month	**Daily Average Temperature (°C)**	**Daily Minimum Temperature (°C)**	**Daily Maximum Temperature (°C)**	**Monthly Average Rainfall (mm)**	**Monthly Average Snow Fall (cm)**
January	-12.0	-17.5	-6.4	17.4	63.2
February	-9.3	-15.0	-3.5	12.3	48.8
March	-4.2	-9.9	1.5	35.4	29.4
April	4.4	-1.5	10.3	55.8	12.7
May	11.2	4.7	17.5	94.8	1.4
June	16.4	10.0	22.9	76.9	0.0
July	19.4	13.0	25.8	85.3	0.0
August	18.0	11.6	24.3	85.0	0.0
September	13.5	8.0	18.9	103.3	0.0
October	6.7	1.8	11.5	100.6	3.9
November	-0.0	-3.9	3.9	67.3	29.0
December	-7.3	-12.0	-2.6	24.8	58.2

Source: Environment Canada, 2015a
Monetville Station: 46°08'33.006"N 80°18'25.044"W, Elevation 221.00 m

4.1.2.2 Air Quality

The MOECC Air Quality Index (AQI) is an indicator of air quality in Ontario, based on air pollutants that are known to have adverse effects on human health and the environment; these include ozone, fine particulate matter, nitrogen dioxide, carbon monoxide, sulphur dioxide and total reduced sulphur compounds. MOECC developed the following categories for AQI readings:

- below 16 is categorized as very good;
- 16 to 31 is good;
- 32 to 49 is moderate but there may be some adverse effects on very sensitive people;
- 50 to 99 is poor and may have adverse effects on sensitive human and animal populations and may cause significant damage to vegetation and property; and
- above 99 is categorized as very poor and may have adverse effects on a large proportion of those exposed (MOECC, 2010).

The Parry Sound AQI monitoring station is the closest station to the HIWEC study area, located approximately 70 km southwest. The 2014 daily data from this station shows an average AQI of 22.38 (good) with a standard deviation of 6.10. The lowest recorded AQI in 2014 was 7 (very good) on September 30 and October 16 and the highest recorded AQI was 45 (moderate) on May 26 (MOECC, 2014).

4.1.3 Terrestrial Environment

In accordance with the HIFN EA Guidance document, available resources and existing data pertaining to the terrestrial environment in the HIWEC study area was reviewed. Information obtained from this background review includes the location and characteristics of known or potential wildlife occurrences and wildlife habitat, vegetation and ecological communities including wetlands, Species of Conservation Concern (SOCC) and SAR occurrences.

The background review was conducted for the entire HIWEC study area to accommodate any potential changes to the proposed HIWEC layout that may occur during the planning stages. The following secondary resources were consulted:

- **Guidance Documents:**
  - *Significant Wildlife Habitat Technical Guide* (Ontario Ministry of Natural Resources and Forestry (MNRF), 2000);
  - *Natural Heritage Assessment Guide for Renewable Energy Projects* (MNRF, 2012a); and
  - *Draft Significant Wildlife Habitat Ecoregion 5E Criterion Schedule* (MNRF, 2012b).
- **Interactive Mapping Sites:**
  - MNRF Make-A-Map: Natural Heritage Areas (MNRF, 2014a);
  - MNRF Natural Heritage Information Centre (NHIC) Rare Species Records (MNRF, 2014b);
  - MNRF Species at Risk by Area (Parry Sound) Online Search Tool (MNRF, 2014c);
  - Important Bird Areas (IBA Canada, 2013);
  - Network of Protected Areas website (EC, 2014);
  - Western Hemisphere Shorebird Reserve Network website (WHSRN, 2012); and
  - Ontario Provincial Parks website (Ontario Parks, 2013).
- **Wildlife Atlases:**
  - Ontario Breeding Bird Atlas (OBBA) website (BSC *et al*., 2006);
  - Ontario Reptile and Amphibian Atlas (Ontario Nature, 2014); and
  - Atlas of the Mammals of Ontario (Dobbyn, 1994).

- **MNRF's mapping from Land Information Ontario** (LIO; MNRF, 2014d) for:
  - Provincial Parks;
  - Conservation Reserves;
  - Provincially Important Wetlands (PIWs);
  - Areas of Natural and Scientific Interest (ANSIs);
  - Unevaluated Wetlands;
  - Wooded Areas;
  - Confirmed Important Wildlife Habitat (IWH) including:
    - Bat Hibernacula;
    - Raptor Nesting Sites;
    - Moose Aquatic Feeding Areas; and
    - Deer Yard or Wintering Areas.
- **Other Sources**:
  - National Parks List (Parks Canada, 2014).

Figure 4-6 illustrates the terrestrial environment features identified through the background review, for which mapping is produced / available.

4.1.3.1 Baseline Field Studies

Field studies were conducted within the HIWEC study area by LGL Limited (LGL) in 2011 and 2012, and by Stantec Consulting Ltd. (Stantec) in 2013. Available information regarding these field studies is summarized below.

The *Nigig Power Corp/Henvey Inlet Wind Project Preliminary Environmental Constraints Analysis* (Neegan Burnside Ltd., 2011) provides a preliminary analysis of the environmental and regulatory constraints for the HIWEC study area, and summarizes the findings of ecological studies completed by LGL in 2011. This report was reviewed for the purpose of the background review. In addition, LGL conducted the following field studies in 2011 and 2012 within the HIWEC study area to determine baseline conditions:

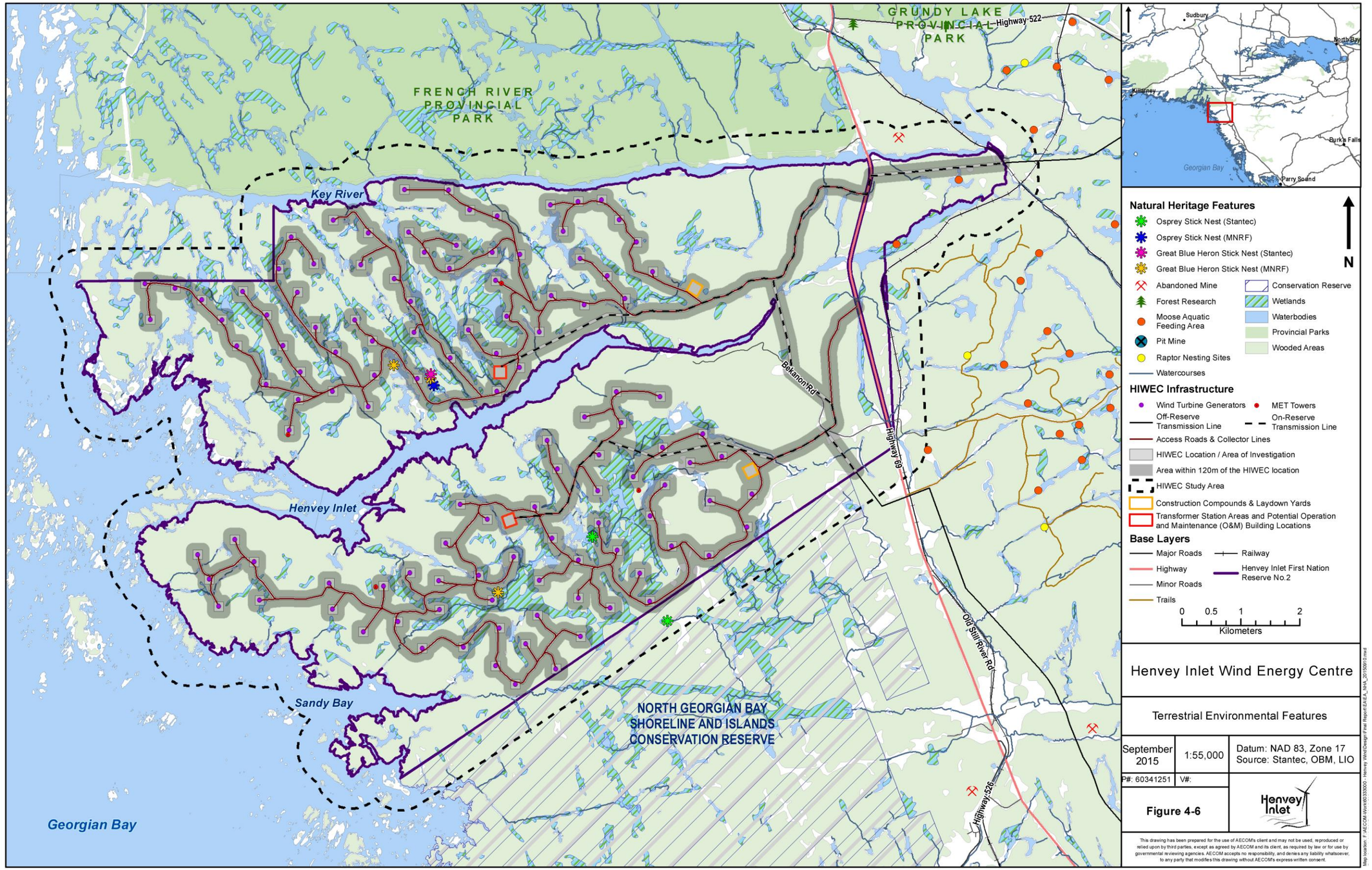
- Raptor Migration;
- Passerine Migration;
- Breeding Birds;
- Herpetological Surveys; and
- Bat Acoustic Monitoring.

In addition, Stantec conducted the following field studies in 2013 within the HIWEC study area to determine baseline conditions:

- Raptor Migration Surveys;
- Passerine Migration Surveys;
- Waterfowl Migration Surveys;
- Breeding Bird Surveys;
- Herpetological Surveys;
- Bat (Acoustic Monitoring) Surveys;
- Ecosite Classification and Rare Flora Surveys; and
- Incidental Wildlife Observations.

Stantec provided raw field and GIS data collected during the 2013 field season to AECOM in October 2014. WSP provided collated field data collected by LGL during the 2011 and 2012 field seasons to AECOM in April 2015. These data were summarized by AECOM into technical reports (hereafter collectively referred to as the "Technical Reports") which are provided in Appendix A of the Natural Heritage Assessment (NHA): Records Review Report, included as **Appendix F1** to the EA Report.

Figure 4-6: Terrestrial Environment Features



AECOM conducted the following field studies in 2014 and 2015 to further supplement the baseline conditions identified from previous studies:

- Ecological Land Classification (ELC) and Botanical Inventory;
- Wildlife Habitat Assessments and Incidental Wildlife Observations;
- Bat Cavity Tree Surveys;
- Raptor Migration Surveys;
- Waterfowl Migration Surveys;
- Shorebird Migration Surveys;
- Daytime Breeding Bird Surveys;
- Crepuscular Breeding Bird Surveys;
- Least Bittern Surveys;
- Amphibian (Frog and Salamander) Surveys;
- Turtle Basking Surveys;
- Snake Basking Surveys;
- Bat Hibernaculum Survey;
- Old Growth Forest surveys;
- Cliff and Talus Slope surveys;
- Mast Producing Area surveys; and
- Branched Bartonia Surveys.

The methods and results of these surveys are described in the NHA: Site Investigation Report (refer to **Appendix F2**) and the NHA: Evaluation of Importance Report (refer to **Appendix F3**).

Information from the baseline field studies described above that is relevant to the VECs for the terrestrial environment is summarized in the following sections. Species are referred to by their common names in the sections that follow; scientific species names are included in **Appendix F**.

4.1.3.2 Wildlife and Wildlife Habitat

4.1.3.2.1 Birds (Including Migratory Birds)

Numerous baseline field studies have been completed between 2011 and 2015 to collect baseline data on breeding birds, bird SAR, bird colonies, migration staging and stopover areas and migration corridors within the HIWEC study area. Detailed results of these surveys are provided in the NHA reports, which are included in **Appendices F1** to **F3** of the EA Report. A brief summary of the baseline data is provided below. A comprehensive list of the bird species recorded between 2011 and 2015 is provided in **Appendix F5** of the EA report. A summary of the bird-related baseline studies completed to date is provided below. These studies have been conducted to meet or exceed federal guidance regarding baseline information needed to complete an environmental assessment of a wind power project on birds (EC, 2007).

- ***Breeding Birds***
  Breeding bird studies within the HIWEC study area were completed in 2011, 2012, 2013 and 2015. The methods and results of the studies completed in 2011, 2012 and 2013 are described in detail in the *Summary of 2011, 2012 and 2013 Breeding Bird Surveys – Henvey Inlet Wind Energy Centre Study Area* (refer to Appendix A of **Appendix F1**). In 2011 and 2012, LGL conducted breeding bird point count surveys, crepuscular breeding bird surveys, Yellow Rail call playback surveys, and owl surveys. A total of 107 species were recorded during the daytime breeding bird surveys. In the crepuscular breeding bird surveys, 39 Whip-poor-will and 27 Common Nighthawk were recorded. As well, two (2) species of owl were recorded and there were no Yellow Rail recorded. In 2013, Stantec conducted

breeding bird point count surveys and area searches, crepuscular breeding bird surveys, and owl surveys. A total of 108 species were recorded during the daytime breeding bird surveys. During the area searches, 114 species were recorded. A total of 27 Whip-poor-will and two (2) Common Nighthawks were observed during the crepuscular breeding bird surveys. No owl species were observed during 2013 surveys. The most common species observed over the three (3) years (2011 to 2013) included White-throated Sparrow, Common Yellowthroat, Nashville Warbler, Ovenbird and Yellow-rumped Warbler. Breeding bird surveys were also completed in 2015; the methods and results of these surveys are described in detail in the NHA: Evaluation of Importance Report (refer to **Appendix F3**). A total of 122 bird species were recorded either through breeding bird surveys or as incidental observations in 2014 and 2015. The most common species observed included Ovenbird, Hermit Thrush, Canada Goose and White-throated Sparrow.

- ***Passerine Migration***
  Passerine migration studies within the HIWEC study area were completed in 2011, 2012 and 2013. The methods and results of these surveys are described in detail in the *Summary of 2011, 2012 and 2013 Spring and Fall Passerine Migration Surveys – Henvey Inlet Wind Energy Centre Study Area* (refer to Appendix A of **Appendix F1**). In 2011, LGL conducted spring and fall migration surveys, with a total of 58 species recorded in the spring, and 50 species recorded in the fall. In 2012, LGL conducted a spring migration survey and a nocturnal migration survey. A total of 50 species were recorded during the 2012 spring migration survey and through the nocturnal migration surveys. Most of the birds detected were low height passes of either sparrows or warblers. In 2013, Stantec conducted both spring and fall migration surveys, recording 73 species in the spring and 62 in the fall. The most common species recorded over the three (3) years (2011 to 2013) included Nashville Warbler, American Robin, Black-capped Chickadee, Blue Jay and White-throated Sparrow.

- ***Raptor Migration***
  Raptor migration studies within the HIWEC study area were completed in 2011, 2012, 2013 and 2015. The methods and results of the studies completed in 2011, 2012 and 2013 are described in detail in the *Summary of 2011, 2012 and 2013 Raptor Migration Surveys – Henvey Inlet Wind Energy Centre Study Area* (refer to Appendix A of **Appendix F1**). In 2011, LGL conducted spring and fall raptor migration surveys, recording 44 raptors, comprised of seven (7) species, in the spring and 426 raptors, comprised of 14 species, in the fall. In 2012, LGL conducted a spring migration and a spring hawk call playback survey. A total of 351 raptors, comprised of 11 species, were recorded during the migration survey, and four (4) species were recorded during the call playback survey. In 2013, Stantec conducted spring and fall raptor migration surveys, recording >201 raptors, comprised of ten (10) species, in the spring and 265 raptors, comprised of 13 species, in the fall. The most common raptors observed over the three (3) years (2011 to 2013) included Turkey Vulture, Northern Harrier, Bald Eagle and Red-tailed Hawk. Raptor migration studies were also completed in 2015; the methods and results of these surveys are described in detail in the NHA: Evaluation of Importance Report (refer to **Appendix F3**). A total of 205 raptors, comprised of 13 species, were observed, with Turkey Vulture as the most commonly observed raptor.

- ***Waterfowl Migration***
  Waterfowl migration studies within the HIWEC study area were completed in 2013, 2014 and 2015. The methods and results of the studies completed in 2013 are described in detail the *Summary of 2013 Waterfowl Migration Surveys – Henvey Inlet Wind Energy Centre Study Area* (refer to Appendix A of **Appendix F1**). A total of 739 waterfowl comprised of ten (10) species were observed over the course of the spring migratory waterfowl surveys, and 438 waterfowl comprised of 14 species were observed in the fall waterfowl migration surveys. The most common species observed in 2013 included Canada Goose, Mallard, Lesser Scaup and Bufflehead. Waterfowl migration studies were also completed in 2014 and 2015; the methods and results of these studies are described in detail in the NHA: Evaluation of Importance Report (refer to **Appendix F3**). A total of 150 waterfowl comprised of six (6) species were

observed during the 2014 survey, and 779 waterfowl comprised of ten (10) species were observed during the 2015 waterfowl migration survey. The most common species observed over the two (2) years (2014 and 2015) included Bufflehead, Ring-necked Duck, Canada Goose and Common Merganser. No large concentrations of waterfowl were identified within 120 m of the proposed HIWEC location in any year.

- ***Shorebird Migration***
  Shorebird migration studies within the HIWEC study area were completed in 2015. The methods and results of these studies are described in detail in the NHA: Evaluation of Importance Report (refer to **Appendix F3**). No shorebirds were recorded during the spring migration survey completed in 2015.

- ***Breeding Colony Surveys***
  Studies for breeding colonies within the HIWEC study area were completed in 2011, 2013, 2014 and 2015. The methods and results of the studies completed in 2011 and 2013 are described in detail in the *Summary of 2011, 2012 and 2013 Breeding Bird Surveys – Henvey Inlet Wind Energy Centre Study Area* (refer to Appendix A of **Appendix F1**). In 2011, 12 potential Great Blue Heron nests were identified, of which two (2) were occupied by herons during an aerial survey; however, the locations of these nests were not provided by LGL to AECOM. In 2013, Great Blue Herons, including one (1) heronry, were recorded. Aerial surveys for stick nests were also completed in 2014 and 2015; the methods and results of these studies are described in detail in the NHA: Evaluation of Importance Report (refer to **Appendix F3**). A total of eight (8) locations with stick nest(s) belonging to Great Blue Herons were identified within 120 m of the HIWEC location; each nesting location had at most three (3) nests. No large heron colonies, consisting of ten (10) or more active nests, were recorded in the HIWEC study area in any year. As well, no rocky islands or peninsulas within 120 m of the HIWEC location were identified to have any ground breeding bird colonies as described in the NHA: Site Investigation Report (refer to **Appendix F2**).

Results of the above studies pertaining to bird SAR are further described in **Section 4.1.5**.

4.1.3.2.2 Bird (Including Migratory Birds) Habitat

The *Migratory Birds Convention Act, 1994 (MBCA)* provides protection to migratory birds, their habitats and nests at the federal level by prohibiting the destruction of active migratory bird nests. Currently, 700 migratory bird species are protected under the *MBCA*, including songbirds, woodland birds, waterfowl, shorebirds and seabirds.

The following bird habitats (including birds listed under the *MBCA*) were identified as potentially occurring in the HIWEC study area through the baseline field studies completed between 2011 and 2015:

- ***Waterfowl Nesting Areas***
  Waterfowl nesting areas are typically located in upland vegetation communities composed of grasses, sedges, rushes, trees and shrubs adjacent to wetland habitat with open standing water. The potential for nesting areas of American Widgeon, American Black Duck, Blue-winged Teal, Green-winged Teal, Wood Duck, Hooded Merganser, Common Merganser, Red-breasted Merganser, Mallard, Canada Goose, American Widgeon, Bufflehead and Common Goldeneye to occur within the HIWEC study area was identified during the background review. A total of 22 waterfowl species were recorded in the HIWEC study area in 2011, 2012 and 2013 (refer to Appendix A of **Appendix F1**).

- ***Bald Eagle and Osprey Nesting, Foraging and Perching Habitat***
  Both species prey on fish in clear, shallow water and therefore nesting habitats must be located near large waterbodies that have large shallow areas with an abundance of fish. According to the OBBA, there is confirmed breeding evidence for Osprey and Bald Eagle in the general vicinity of the HIWEC study area (BSC, *et al*. 2006). As described in the NHA: Records Review Report (refer to **Appendix F1**), both

species were recorded in 2011, 2012 and 2013, and two (2) large stick nests were recorded by Stantec in 2013 in the HIWEC study area. One (1) Osprey stick nest was also identified by MNRF in the HIWEC study area. As described in the NHA: Site Investigation Report (refer to **Appendix F2**), a total of two (2) unoccupied Osprey stick nests, were identified within 120 m of the proposed HIWEC location through 2015 field studies. No Bald Eagle nests have been identified within the HIWEC study area.

- ***Woodland Raptor Nesting Habitat***
  The majority of the HIWEC study area is covered by extensive tracts of wooded areas that serve as potentially suitable nesting habitat for a variety of raptor species. The potential for nesting habitat of Red-tailed Hawk, Broad-winged Hawk, Sharp-shinned Hawk, Merlin, Barred Owl, Red-shouldered Hawk, Cooper's Hawk and Northern Goshawk to occur within the HIWEC study area was identified through the background review (refer to **Appendix F1**). A total of 14 raptor species were recorded in the HIWEC study area in 2011, 2012 and 2013 (refer to Appendix A of **Appendix F1**). Numerous wooded areas within the HIWEC study area having the potential to serve as suitable raptor nesting habitat were identified through the 2014 and 2015 field studies (refer to **Appendix F2**).

- ***Mast Producing Areas***
  Mature forests containing an abundance of mast-producing species may occur within the wooded areas in the HIWEC study area. Ruffed Grouse, a target species for this habitat type, was recorded with the HIWEC study area in 2011, 2012, 2013, 2014 and 2015 (refer to **Appendices F1 and F2**). Several potential mast producing areas were identified in the HIWEC study area through the 2014 and 2015 field studies (refer to **Appendix F2**); of these, one (1) was confirmed as a mast producing area (refer to **Appendix F3**).

- ***Marsh Bird Breeding Habitat***
  According to the OBBA (BSC, *et al*. 2006) there are records for American Bittern, Pied-billed Grebe, Common Loon, Sandhill Crane, Marsh Wren and Yellow Rail in the general vicinity of the HIWEC study area. A total of 12 marsh breeding bird species were recorded in the HIWEC study area in 2011, 2012 and 2013 (refer to Appendix A of **Appendix F1**). Through the 2014 and 2015 field studies, several locations were identified to potentially contain suitable marsh breeding habitats within 120 m of the proposed HIWEC location (refer to **Appendix F2**).

The locations and boundaries of these bird habitats identified as potentially occurring within the HIWEC study area are mapped on Figures 3-5a to 3-5y of the NHA: Site Investigation Report (refer to **Appendix F2**).

The following bird habitats (including birds listed under the *MBCA*) have been determined not to occur in the HIWEC study area through the baseline field studies completed between 2011 and 2015:

- ***Waterfowl Stopover and Staging Areas (Aquatic)***
  There are many lakes, beaver ponds and wetlands located within the HIWEC study area. All of these areas including the shoreline of Georgian Bay, the Key River and Henvey Inlet have potential to support aquatic waterfowl stopover and staging areas. Waterfowl migration surveys were conducted in 2013, 2014 and 2015. A total of 2,106 waterfowl were recorded across all three (3) years; however, no large concentrations (i.e., > 100 individuals) of waterfowl were recorded within 120 m of the proposed HIWEC location (refer to **Appendix F3**). This type of bird habitat is not present within 120 m of the proposed HIWEC location.

- ***Shorebird Migratory Stopover Areas (Shorebird Staging)***
  The HIWEC study area is dominated by rock barrens and bounded by lakeshores of Georgian Bay, Sandy Bay, Key River and Henvey Inlet. Additionally, there are numerous wetlands present. These areas have the potential to support shorebird migratory stopover areas. Shorebird migratory studies

were completed in 2015, and no large concentrations of shorebirds were recorded anywhere in the HIWEC study area (refer to **Appendix F3**). Therefore, the HIWEC study area does not support this type of bird habitat.

- ***Colonially-Nesting Bird Breeding Habitat (Bank and Cliff)***
  The potential for nesting colonies of Bank Swallows, Cliff Swallows and Northern Rough-winged Swallows to occur within the HIWEC study area was identified during the background review. These habitats include shoreline bluffs, river banks, sand piles, abandoned pits, steep rock faces and steep slopes. During the field studies completed from 2011 to 2015, no bank or cliff colonially-nesting bird species were recorded in the HIWEC study area. Additionally, no colonially-nesting breeding bird habitats were identified within 120 m of the proposed HIWEC location. A few isolated cliff and talus slope features were identified during field studies completed in 2014 and 2015, but no nests were observed at these locations (refer to **Appendix F2**). Therefore, this habitat is not present in the HIWEC study area.

- ***Colonially-Nesting Bird Breeding Habitat (Trees / Shrubs)***
  There are numerous wetlands located within the HIWEC study area, which could provide habitat for colonially tree nesting bird species. A total of eight (8) locations with stick nest(s) belonging to Great Blue Herons were identified within 120 m of the proposed HIWEC location; however, no large heronries, consisting of at least ten (10) active nests, were identified at any of these locations. The aerial studies completed in 2014 and 2015 encompassed the entire HIWEC study area; no large heronries were observed (refer to **Appendix F3**). Although several small colonies of up to three (3) nests are present, the HIWEC study area does not support any large colonies of tree or shrub nesting birds.

- ***Colonially-Nesting Bird Breeding Habitat (Ground)***
  Colonies of ground-nesting colonial birds may occur on any rocky island or peninsula (natural or artificial) within marshy areas, lakes or large rivers. The potential for nesting colonies of Herring Gulls, Great Black-backed Gulls, Ring-billed Gulls, Common Terns and Caspian Terns to occur within the HIWEC study area was identified during the background review. Suitable habitats were assessed along the shorelines of Georgian Bay, the Key River, Henvey Inlet and Sandy Bay within the HIWEC study area. Five (5) colonially ground-nesting bird species were recorded in the HIWEC study area in 2011, 2012 and 2013 (refer to **Appendix F1**). Additionally, four (4) species were recorded during the 2015 field studies, as well as colonies of gull and tern further offshore and more than 120 m away from proposed HIWEC location. No colonially-nesting bird breeding habitat for ground nesting birds were found inland within the HIWEC study area during the baseline studies (refer to **Appendix F2**). Therefore, the HIWEC study area does not support this type of bird habitat.

4.1.3.2.3 Mammals

The following mammal habitats were identified as potentially occurring in the HIWEC study area through the baseline field studies completed between 2011 and 2015:

- ***Bat Hibernacula***
  In Ontario, bats overwinter in hibernacula which may be found in abandoned mine shafts, caves, underground foundations and karst. The potential for hibernacula of Big Brown Bat, Little Brown Bat, Tri-colored Bat, Northern Myotis and Eastern Small-footed Myotis to occur within the HIWEC study area was identified during the background review. Acoustic monitoring conducted in the HIWEC study area in 2011, 2012 and 2013 indicates that eight (8) bat species are present (refer to Appendix A of **Appendix F1**). One (1) abandoned mine was identified through the background review; however, it is located more than 400 m from the proposed HIWEC location. During the 2015 field studies, one (1) potential cave feature was identified within 120 m of the proposed HIWEC location (refer to **Appendix F2**) but was confirmed as not a suitable hibernaculum for hibernating bats (refer to **Appendix F3**).

- ***Bat Maternity Colonies***
  There are mixed and coniferous forest stands located in the HIWEC study area, which may contain suitable bat cavity trees. Acoustic monitoring conducted in the HIWEC study area in 2011, 2012 and 2013 confirmed the presence of eight (8) bat species (refer to Appendix A of **Appendix F1**). Through bat cavity tree searches completed in 2015, numerous wooded areas containing potentially suitable bat maternity colony habitat (i.e., cavity trees) were identified within 120 m of the proposed HIWEC location (refer to **Appendix F2**).

- ***Deer Yarding Areas***
  Deer yarding areas are areas where deer move to suitable woodlands in response to the onset of winter snow and cold in order to reduce or avoid the impacts of winter conditions. Deer yarding areas are typically determined and mapped by the MNRF. There are no deer yarding areas as identified by the MNRF within or in close proximity to the HIWEC study area. However, because the MNRF does not have jurisdiction over the HIFN I.R. #2, the presence of deer yards cannot be ruled out. Communities with a high abundance of Eastern White Cedar, Eastern Hemlock or White Spruce are considered most likely to provide suitable habitat. A total of four (4) potentially suitable deer yarding areas were identified within 120 m of the proposed HIWEC location through the 2014 and 2015 field studies (refer to **Appendix F2**).

- ***Aquatic Feeding Habitat***
  Aquatic feeding habitats of Moose and White-tailed Deer may occur in association with wetlands, rivers, lakes and beaver ponds in the HIWEC study area. Evidence of Moose and White-tailed Deer were recorded in the HIWEC study area during the field studies completed from 2011 to 2015. Several features consisting of wetland and adjacent conifer or mixed forest were identified as potential aquatic feeding habitats within 120 m of the proposed HIWEC location (refer to **Appendix F2**).

- ***Mast Producing Areas***
  Mast is a very important food requirement for wildlife species including Black Bear, White-tailed Deer, Wild Turkey and Ruffed Grouse. Mature forests containing an abundance of mast-producing species may occur within the wooded areas in the HIWEC study area. Black Bear and White-tailed Deer were recorded with the HIWEC study area in 2013. Several potential mast producing areas were identified in the HIWEC study area through the 2014 and 2015 field studies (refer to **Appendix F2**); of these, one (1) was confirmed as a mast producing area (refer to **Appendix F3**).

The locations and boundaries of these mammal habitats identified as potentially occurring within the HIWEC study area are mapped on Figures 3-5a to 3-5y of the NHA: Site Investigation Report (refer to **Appendix F2**).

The following mammal habitats have been determined not to occur in the HIWEC study area through the baseline field studies completed between 2011 and 2015:

- ***Denning Sites for Mink, Otter, Marten, Fisher and Eastern Wolf***
  Denning sites may occur within wooded areas in the HIWEC study area. River Otter (*Lontra canadensis*) and Eastern Wolf were recorded in the HIWEC study area in 2013. There are also two (2) records of weasels from 2013 that could not be identified to the species level. In total, four (4) potential mammal denning sites for Fisher or Eastern Wolf were identified within 120 m of the proposed HIWEC location through the 2014 and 2015 field studies (refer to **Appendix F2**). Upon an additional survey on September 17, 2015, none of these dens were determined to be suitable for American Mink , River Otter, American Marten , Fisher or Eastern Wolf (refer to **Appendix F2**). Of these potential denning sites, two (2) are likely used by Coyote and Black Bear , both of which are abundant and common in the HIWEC study area. The remaining potential mammal denning sites unlikely function as suitable mammal dens due to lack of vegetation cover and exposure to environmental elements (i.e., weather conditions, insects, etc.).

- ***Mineral Licks***
  Mineral licks are found in locations of upwelling groundwater, are comprised of the sediment around seepage areas and may occur in association with seeps and springs located in wooded areas. Evidence of Moose and White-tailed Deer was recorded in the HIWEC study area in during field studies completed from 2011 to 2015; however, no mineral licks were identified within 120 m of the proposed HIWEC location (refer to **Appendix F2**).

- ***Cervid Movement Corridors***
  Cervid movement corridors consist of wooded areas that link habitat important to cervids for survival (e.g., deer yards, mineral licks, moose aquatic feeding habitat). In the context of the HIWEC study area, there are numerous sites where cervids carry out their life processes in an entirely natural landscape with an absence of areas that would impede their movement and therefore cervid movement is not confined. As a result, cervids are able to move in any direction or broadly across the landscape, between their important winter and feeding habitats, and therefore no specific cervid movement corridors were defined (refer to **Appendix F2**).

- ***Furbearer Movement Corridors***
  Furbearer movement corridors may occur in association with shoreline habitats along lakes, ponds and watercourses. River Otter and Eastern Wolf were recorded in the HIWEC study area in 2013. There are also two (2) records of weasels from 2013 that could not be identified to the species level (refer to Appendix A in **Appendix F1**). No furbearer movement corridors were identified within the HIWEC study area through the 2014 and 2015 field studies (refer to **Appendix F2**).

4.1.3.2.4 Amphibians

The following amphibian habitats were identified as potentially occurring in the HIWEC study area through the baseline field studies completed between 2011 and 2015:

- ***Amphibian Breeding Habitat (Woodland and Wetland)***
  Amphibian breeding habitats (woodland and wetland) may occur in association with wetlands, vernal pools, lakes or ponds within the HIWEC study area. The potential for breeding habitat of Eastern Newt, Blue-spotted Salamander, Spotted Salamander, Four-toed Salamander, Spring Peeper, Wood Frog, American Toad, Gray Treefrog, Western Chorus Frog, Northern Leopard Frog, Pickerel Frog, Green Frog, Mink Frog and Bullfrog to occur within the HIWEC study area was identified during the background review. Numerous locations were identified as having standing water or vernal pools potentially suitable for supporting breeding amphibian populations within the HIWEC study area through the field studies completed in 2014 and 2015 (refer to **Appendix F2**). Of these, 13 locations were assessed and confirmed as habitats supporting a diversity of breeding amphibian species (refer to **Appendix F3**).

The locations and boundaries of these amphibian breeding habitats identified as potentially occurring within the HIWEC study area are mapped on Figure 3-5s of the NHA: Site Investigation Report (refer to **Appendix F2**).

The following amphibian habitats were determined not occur in the HIWEC study area through the baseline field studies completed between 2011 and 2015:

- ***Amphibian Corridors***
  Amphibian corridors may occur in association with riparian or naturally vegetated areas. In the context of the HIWEC study area, there are numerous sites where amphibians breed in an entirely natural landscape with an absence of areas that would impede movement and therefore amphibian movement is not confined. As a result, amphibians are able to move in any direction or broadly across the landscape, between breeding sites and potential summer habitat and therefore no specific amphibian breeding corridors were defined (refer to **Appendix F2**).

4.1.3.2.5 Reptiles

The following reptile habitats were identified as potentially occurring in the HIWEC study area through the baseline field studies completed between 2011 and 2015:

- ***Turtle Wintering Areas***
  There are many fens, bogs, marshes, lakes and beaver ponds located in the HIWEC study area that may provide suitable turtle overwintering or hibernation habitats. Several turtle species, including Midland Painted Turtle, Northern Map Turtle and Snapping Turtle were recorded in the HIWEC study area between 2011 and 2015. Numerous potential turtle wintering areas were identified within 120 m of the proposed HIWEC location through the field studies completed in 2014 and 2015 (refer to **Appendix F2**).

- ***Reptile Hibernacula***
  Burrows, rock crevices and areas of broken and fissured rock allow snakes to enter the ground below the frost line and provide protection from harsh winter temperatures, which facilitates overwinter survival. Wetlands such as conifer or shrub swamps, poor fens, or depressions in bedrock with Sphagnum moss or sedge hummock ground cover can also provide important overwintering habitat for snakes. The potential for hibernacula of Eastern Gartersnake, Northern Watersnake, Red-bellied Snake, Dekay's Brownsnake, Smooth Green Snake, Ring-necked Snake, Milksnake, Eastern Ribbonsnake and Five-lined Skink to occur within the HIWEC study area was identified during the background review. All of these snake species were recorded in the HIWEC study area between 2011 and 2015 (refer to **Appendices F1, F2** and **F3**). Numerous potentially suitable reptile hibernacula habitats were identified within the HIWEC study area through the field studies completed in 2014 and 2015 (refer to **Appendix F2**).

- ***Turtle and Lizard Nesting Areas***
  Turtle nesting habitat is typically located within several hundred metres of a permanent water feature, is elevated to prevent the nest from being inundated, and usually consists of sand or sand mixed with gravel as these are light enough to allow turtles to dig out nests. Five-lined Skinks use a variety of nesting sites to lay their eggs, such as beneath or within decaying logs, trees or stumps and beneath rocks. In the Great Lakes / St. Lawrence population, nests are usually formed underneath rock covers in small depressions of soil over rock substrates (Committee on the Status of Endangered Wildlife in Canada (COSEWIC), 2007a). The potential for nesting areas of Midland Painted Turtle, Northern Map Turtle, Snapping Turtle and Five-lined Skink to occur within the HIWEC study area was identified during the background review. Several turtle species, including Midland Painted Turtle, Northern Map Turtle and Snapping Turtle, were recorded in the HIWEC study area between 2011 and 2015. Numerous potential turtle nesting areas were identified through the field studies completed in 2014 and 2015, and predated turtle nests identified in 2012 and 2013 were found to be concentrated in one (1) of these areas (refer to **Appendix F2**).

The locations and boundaries of these reptile habitats identified as potentially occurring within the HIWEC study area are mapped on Figures 3-5a to 3-5y of the NHA: Site Investigation Report (refer to **Appendix F2**).

4.1.3.2.6 Species of Conservation Concern

Bird, mammal, amphibian and reptile SOCC with the potential to occur within the HIWEC study area were identified through the background review. For the purpose of this EA, SOCC are defined as follows:

- Provincially rare species ranked by the NHIC as S1 (critically imperiled), S2 (imperiled) or S3 (vulnerable) in the province of Ontario but not listed as Endangered or Threatened under Schedule 1 of the federal *SARA* or the provincial *Endangered Species Act, 2007* (*ESA*);

- Species listed as Special Concern under Schedule 1 of *SARA*;
- Species evaluated by the COSEWIC as Special Concern, Threatened or Endangered but not listed as Endangered or Threatened under Schedule 1 of *SARA* or the *ESA*; and
- Species listed as Special Concern under the *ESA*.

A total of 23 SOCC were identified through the Records Review (refer to **Appendix F1**) as having records within the HIWEC study area and / or surrounding area. Of these, 18 SOCC were identified as occurring or having the potential to occur within the HIWEC study area based on the background review and are summarized in **Table 4-3**. The observation year(s) of these species across all baseline field studies conducted between 2011 and 2015 are also summarized in **Table 4-3**.

Although Long-tailed Duck, Lapland Longspur, Great Black-backed Gull, Rusty Blackbird and Red-necked Grebe were recorded in 2011, 2012 and / or 2013, these are considered to be migrant species as their breeding ranges are not located in the vicinity of the HIWEC study area. Breeding habitat for these species is considered unlikely to be present in the HIWEC study area and therefore these species are not included in **Table 4-3**.

Table 4-3: SOCC Occurring or Potentially Occurring in the HIWEC Study Area

Common Name	Scientific Name	S-rank[1]	ESA Status[2]	COSEWIC Status[3]	SARA Status[4]	Observation Year			
						2011 / 2012	2013	2014	2015
Bird Species (8)									
Bald Eagle	*Haliaeetus leucocephalus*	S2	SC	NAR	NAR	Yes	Yes	Yes	Yes
Black Tern	*Chlidonias niger*	S3	SC	NAR	NAR	No	Yes	No	No
Caspian Tern	*Sterna caspia*	S3	NAR	NAR	NAR	Yes	Yes	No	Yes
Eastern Wood-Pewee	*Contopus virens*	S4	SC	SC	No Status (No Schedule)	No	Yes	No	Yes
Peregrine Falcon	*Falco peregrinus*	S3	SC	SC	SC (Schedule 1)	Yes	No	No	Yes
Prairie Warbler	*Setophaga discolor*	S3	NAR	NAR	NAR	No	Yes	No	No
Wood Thrush	*Hylocichla mustelina*	S4	SC	THR	No Status (No Schedule)	Yes	Yes	No	Yes
Yellow Rail	*Coturnicops noveboracensis*	S4	SC	SC	SC (Schedule 1)	No	Yes	No	No
Insect Species (4)									
Horned Clubtail	*Arigomphus cornutus*	S3	-	-	-	No	Yes	No	No
Monarch	Danaus plexippus	S2	SC	SC	SC (Schedule 1)	No	Yes	No	No
Mottled Darner	*Aeshna clepsydra*	S3	-	-	-	No	Yes	No	No
Pine Imperial Moth	*Eacles imperialis pini*	S3?	-	-	-	No	Yes	No	No
Mammal Species (1)									
Eastern Wolf	*Canis lupus lycaon*	S4	SC	SC	SC (Schedule 1)	No	Yes	No	Not confirmed
Reptile Species (5)									
Common Five-lined Skink (Southern Shield population)	*Plestiodon fasciatus pop. 2*	S3	SC	SC	SC (Schedule 1)	Yes	Yes	No	Yes
Eastern Ribbonsnake	*Thamnophis sauritus*	S3	SC	SC	SC (Schedule 1)	No	No	No	No
Milksnake	*Lampropeltis triangulum*	S3	SC	SC	SC (Schedule 1)	No	Yes	No	No
Northern Map Turtle	*Graptemys geographica*	S3	SC	SC	SC (Schedule 1)	No	No	No	No
Snapping Turtle	*Chelydra serpentina*	S3	SC	SC	SC (Schedule 1)	Yes	Yes	No	Yes

Notes: 1, 2, 3, 4 See Notes at the end of Section 4.1

Potentially suitable habitats for the following SOCC were identified in the HIWEC study area through the field studies completed in 2014 and 2015 (refer to **Appendix F2**):

- Black Tern;
- Eastern Wood-pewee;
- Prairie Warbler;
- Wood Thrush;
- Yellow Rail;
- Horned Clubtail;
- Mottled Darner;
- Pine imperial Moth;
- Eastern Wolf;
- Common Five-lined Skink;
- Eastern Ribbonsnake;
- Milksnake;
- Northern Map Turtle; and
- Snapping Turtle.

The locations and boundaries of potentially suitable habitats for these species are mapped on Figures 3-5a to 3-5y of the NHA: Site Investigation Report (refer to **Appendix F2**).

4.1.3.3 Vegetation and Ecological Communities

4.1.3.3.1 Flora

The HIWEC study area is located in Ecoregion 5E (Georgian Bay Ecoregion) which is situated in south-central Ontario on the Canadian Shield and comprises 7,447,869 ha. It extends from Lake Superior in the west to the Quebec border in the east (Crins *et al*., 2009). The majority (32%) of the Ecoregion is dominated by mixed forest, followed by deciduous forest (22%), coniferous forest (12%) and sparse forest (11%). Dominant trees represent a mixture of Great Lakes – St. Lawrence forest species and Boreal forest species, including Eastern White Pine, Red Pine, Eastern Hemlock, Black Spruce, White Spruce, Balsam Fir, Jack Pine, Tamarack, Yellow Birch, Sugar Maple and other hardwoods (Crins *et al*., 2009).

Field studies completed by Stantec in 2013 identified ten (10) general vegetation community series in the HIWEC study area, which included Jack Pine rock barrens, coniferous forests dominated by White Pine and Red Pine, mixed forests, deciduous forests, coniferous swamps, deciduous swamps, fens including treed, shrub and open fens, meadow and shallow marshes, coastal marshes and fens, coastal shallow waters, sandy openings and roadsides (refer to **Appendix F1**). Stantec did not record any provincially or federally protected plant species in 2013 but did identify 22 species that are Regionally Important in Ecodistrict 5E-7 and 63 that are rare in the District of Parry Sound (refer to **Appendix F1**).

ELC field studies using the ELC protocol for Southern Ontario as outlined in Lee *et al.* (1998) were completed by AECOM in 2014 and 2015 to identify and classify vegetation communities as well as confirm the boundaries, stand structure and species composition of the vegetation community types found within 120 m of the proposed HIWEC location. A total of 26 vegetation community series, comprised of 77 ELC vegetation community types of which Jack Pine Acidic Treed Rock Barren Type (RBT3-2) is the most common, were identified within 120 m of the HIWEC location (refer to **Appendix F2**). In 2014, a total of 104 vascular plants were observed within the HIWEC study area. Of these, 103 (99%) are native and one (1) (1%) is exotic. In 2015, a total of 598 vascular plant, moss and lichen species were observed within the HIWEC study area, including 457 vascular plant species. Of these, 344 (75%) are native and 18 (0.05%) are exotic, and an additional 95 (21%) plants are unranked (refer to **Appendix F2**).

The following Rare Vegetation Communities were either confirmed to occur or identified as potentially occurring within the HIWEC study area through the baseline field studies completed between 2011 and 2015:

- ***Cliffs and Talus Slopes***
  Cliffs and talus slopes are uncommon to rare habitats within Ecoregion 5E. The potential for cliffs and talus slopes to occur within the HIWEC study area was identified during the background review. A total of six (6) isolated and potential cliff and talus slope features were identified within 120 m of the proposed HIWEC location during the 2014 and 2015 field studies (refer to **Appendix F2**). Of these, one

(1) was confirmed as a cliff and talus slope vegetation community and another one (1) was located outside of the HIFN I.R. # 2 across the Key River and was not surveyed. The remaining four (4) features were confirmed to not be cliff and talus slopes as they lacked species characteristic of this rare vegetation community (refer to **Appendix F3**).

- ***Precambrian Rock Barrens***
  Precambrian rock barrens are characterized by extensive areas of exposed, sparsely vegetated granitic bedrock. Vegetation coverage can vary from patchy and barren to up to 60% tree cover. The HIWEC study area is located on the Canadian Shield and the landscape is dominated by Precambrian rock barrens. The presence of abundant Precambrian rock barrens within the HIWEC study area was confirmed during the 2014 and 2015 field studies (refer to **Appendix F2**).

- ***Sand Barrens***
  Sand barrens are characterized by sparse vegetation and exposed sand substrates, often caused by extended periods of drought or disturbance such as fire or erosion. The potential for sand barrens to occur within the HIWEC study area was identified during the background review. Two (2) sand barren vegetation communities were confirmed to occur within the HIWEC study area during the 2014 and 2015 field studies (refer to **Appendix F2**).

- ***Old-growth Forest***
  Old-growth forest stands have diverse tree structures which consist of a broad range of tree sizes including very large trees, large standing snags and abundant downed wood of variable sizes. The HIWEC study area contains relatively large tracks of undisturbed wooded areas, wherein old-growth forests may occur. One (1) potential old-growth forest was identified within 120 m of but outside of the proposed HIWEC Location during the 2014 and 2015 field studies (refer to **Appendix F2** and **F3**).

- ***Bogs***
  Bogs are nutrient poor, acid peatlands that are dominated by peat mosses (e.g., Sphagnum moss), ericaceous shrubs, and sedges where the water table is at or near the surface in the spring, and slightly lower during the remainder of the year. There are several unevaluated wetlands, including bogs, located within the HIWEC study area. The presence of bogs within the HIWEC study area was confirmed during the 2014 and 2015 field studies (refer to **Appendix F2**).

The locations and boundaries of the rare vegetation communities outlined above are mapped on Figures 3-5a to 3-5y of the NHA: Site Investigation Report (refer to **Appendix F2**).

The following Rare Vegetation Communities were determined not to occur within the HIWEC study area through the baseline field studies completed between 2011 and 2015:

- ***Shallow Atlantic Coastal Marshes***
  The shallow Atlantic coastal marsh community type is provincially rare and almost entirely restricted to Ecoregion 5E. These shallow marshes occur on shallow mineral or mineral organic shorelines subject to low wave energy. A number of shallow marsh vegetation communities were identified within the HIWEC study area during the 2014 and 2015 field studies; however, none of these contained the plant species that are characteristic of this rare vegetation community type (refer to **Appendix F2**). Therefore, no shallow Atlantic coastal marshes are present within the HIWEC study area.

- ***Rare Forests (Red Spruce and White Oak)***
  The HIWEC study area includes undisturbed wooded areas, wherein rare forests may occur. However, no rare forest species were recorded within the HIWEC study area during the field studies completed in 2013, 2014 and 2015 (refer to **Appendix F2**). Therefore, no rare forests are present within the HIWEC study area.

4.1.3.3.2 Parks and Designated Natural Areas

The following is a summary of findings from the background review with respect to Federal and Provincial Parks, Conservation Reserves and Protected Areas.

There are no federal parks located within the HIWEC study area. However, one (1) Provincial Park and one (1) Provincial Conservation Reserve are located in the HIWEC study area as shown on **Figure 4-6**. No HIWEC location is proposed within these features.

The French River Provincial Park (Waterway Class) is located within the HIWEC study area along the north side of the Key River. It is comprised of 52,452 ha of Crown land on the Canadian Shield, and includes the shorelands on both sides of the French River, including the water (MNRF, 2006a and 1993). The Park is managed according to the *Provincial Park Policy and Park Management Plan* (MNFR, 1993). It supports and protects more than 450 plants, including rare plant species. The wetlands located at the French River's mouth on Georgian Bay contain the largest community of Virginia Chain Fern in Ontario, which is considered as a nationally important species. The Park also contains and protects habitat and a population of Massasauga Rattlesnake, which is a provincially and federally protected species.

The North Georgian Bay Shoreline and Islands Conservation Reserve is located within the HIWEC study area along the south side of the HIFN I.R. #2 lands. This Provincial Conservation Reserve is comprised of 20,225 ha and stretches along the coastline and inland environments that support numerous wetlands and wildlife habitat, including habitats for the Massasauga Rattlesnake and Caspian Tern (MNRF, 2006b). The Provincial Conservation Reserve is managed by the general policies in the *Land Use Strategy* (1999) and *Provisions of the Provincial Parks and Conservation Reserve Act* (2006) with possible co-management opportunities with local First Nations (MNRF, 2006b).

HIFN I.R. #2 is also part of the Georgian Bay Biosphere Reserve which is designated as a United Nations Educational, Scientific, and Cultural Organization (UNESCO) Biosphere Reserve (Georgian Bay Biosphere, 2015).

There are no Life Science or Earth Science ANSIs, IBAs, Migratory Bird Sanctuaries (MBS), National Wildlife Areas (NWA), and sites in the WHSRN located within or in the vicinity of the HIWEC study area.

4.1.3.3.3 Wetlands

As described above, field studies surveys completed in 2013 identified several wetland communities in the HIFN I.R. #2 including coniferous swamps, deciduous swamps, fens including treed, shrub and open fens, meadow and shallow marshes, coastal marshes and fens, and coastal shallow waters (refer to **Appendix F1**).

Based on the field studies completed in 2014 and 2015, a total of four (4) wetland complexes, comprising 2,445 ha of wetlands, were identified within the HIWEC study area. The boundaries of these wetlands are mapped on Figure 3-3 of the NHA: Site Investigation Report (refer to **Appendix F2**). The identified wetland features are composed of a mosaic of bog, fen, marsh and swamp wetland types. All four (4) site types were found throughout the HIFN I.R. #2. The HIFN I.R. #2 contains lacustrine wetlands influenced by Henvey Inlet and Georgian Bay, riverine wetlands influenced by the Key River, isolated bogs relying on atmospheric moisture, and palustrine wetlands influenced by surface flow and watercourses.

Of the identified 2,445 ha of wetland within the HIFN I.R. #2, 816 ha or 33% of wetlands observed are located within 120 m of the HIWEC location, 385 ha or 47% of which are classified as swamp wetland type. Fen wetland type comprises 205 ha or 25%, marsh wetland type makes up 173 ha or 21% and bog wetland type accounts for the remaining 53 ha or 7% of the wetlands within 120 m of the HIWEC location. Each of these wetlands can be further divided into palustrine, lacustrine, isolated or riverine site types, with palustrine being the most commonly observed site type and making up 1,605 ha or 67% of wetlands within the HIFN I.R. #2.

Swamps are the most abundant wetland type observed within the HIFN I.R. #2. These wetlands consist of dominant vegetation including Black Spruce, Tamarack, Speckled Alder, American Mountain Ash, Leatherleaf, Labrador Tea, Canada Mayflower, Three-leaved False Solomon's Seal and peat mosses.

Fen wetlands types are also abundant. Dominant plant species within these wetlands include Tamarack, Sheep Laurel, Leatherleaf, a variety of sedge species and peat mosses.

Marsh wetlands are scattered throughout all four (4) wetland complexes, although they are particularly abundant within wetland complexes WET-003 and WET-004. Marshes, including open water marshes, contain a dominant mixture of sedge species as well as robust emergent plants, and floating and free floating plant species.

Bogs were noted to occur within wetland complexes WET-001, WET-002, and WET-003 although not abundant given the available overland flow across the HIWEC study area. Bogs within the HIWEC study area are composed of dominant plant species including Leatherleaf, a variety of sedge species and peat mosses.

These four (4) wetland complexes were evaluated through the Ontario Wetland Evaluation System (OWES) (MNRF, 2014e) and were determined to be PIWs as described in the NHA: Evaluation of Importance Report (refer to **Appendix F3**).

4.1.3.3.4 Woodlands

As described above, field studies completed in 2013 identified several forest communities within the HIWEC study area, including Jack Pine rock barrens, coniferous forest, mixed forests, deciduous forests, coniferous swamps and deciduous swamps (refer to **Appendix F1**).

Based on the field studies completed in 2014 and 2015, a total of 72 woodlands, comprising 4,609 ha, were identified at least partially within 120 m of the proposed HIWEC location. The boundaries of these woodlands are mapped on Figure 3-4 of the NHA: Site Investigation Report (refer to **Appendix F2**). The identified woodland features are composed of a mosaic of treed rock barren, coniferous forest, mixed forest, deciduous forest, cultural woodland, coniferous swamp, mixed swamp and deciduous swamp. Woodlands provide habitat for a variety of plants and animals and are important for carbon storage and water and soil retention. All 72 site types were found throughout the HIWEC study area. Treed rock barrens are the most abundant woodland type observed within the HIWEC study area and are dominated by Jack Pine, Common Juniper, Low Sweet Blueberry, Common Hairgrass, Poverty Oat Grass, and various lichens. Mixed forest woodland types are also abundant. Dominant plant species within these woodlands include White Pine, White Spruce, Red Maple, White Birch, Trembling Aspen, Balsam Fir, Red Oak, and variable shrub and ground layers.

Of the 72 woodlands, 35 were determined to be Important as described in the NHA: Evaluation of Importance Report (refer to **Appendix F3**).

4.1.3.3.5 Species of Conservation Concern

No plant SOCC were identified as having the potential to occur within the HIWEC study area through the background review, and none were identified during the field studies completed between 2011 and 2015.

4.1.4 Aquatic Environment

In accordance with the HIFN EA Guidance document, available resources and existing data pertaining to the aquatic environment was reviewed. Information obtained from this background review provides insight, such as where waterbodies occur in the HIWEC study area, their potential to support a fish community, the composition of the existing fish community, critical fish habitat, SAR occurrences, and their cultural, recreational and commercial uses.

The background review was conducted for the entire HIWEC study area to accommodate any potential changes to the proposed HIWEC layout that may occur during the planning stages. **Figure 4-7** illustrates some of the aquatic environment features identified through background review.

The background review was completed to identify the presence of waterbodies, fish and fish habitat, and endangered species / SAR, located within or in the immediate vicinity of the HIWEC study area using the following secondary resources:

- Interactive Mapping Sites:
  - MNRF Make-A-Map: Natural Heritage Areas (2015);
  - MNRF NHIC Rare Species Records (2014b);
  - University of Guelph *FishMAP* Online Tool (University of Guelph, 2011)
- MNRF's Natural Resources and Values Information System (NRVIS) mapping from LIO for:
  - Waterbody, watercourse, wetland layers;
  - Thermal Regime; and
  - Fish Records.

A request for information was submitted to MNRF's, Parry Sound District office on January 27 and February 17, 2015 for any data gaps identified during the background review.

A request for information was submitted to DFO Fisheries Protection Program office in Burlington, Ontario on March 16th, 2015 for any additional fishery or SAR data.

Results of the background review and preliminary description of the aquatic environments within the HIWEC study area is provided in the Water Assessment and Waterbody Report included as **Appendix H**. Data collected was supplemented during aquatic habitat field assessments in the spring and summer of 2015.

4.1.4.1 Previous Field Studies

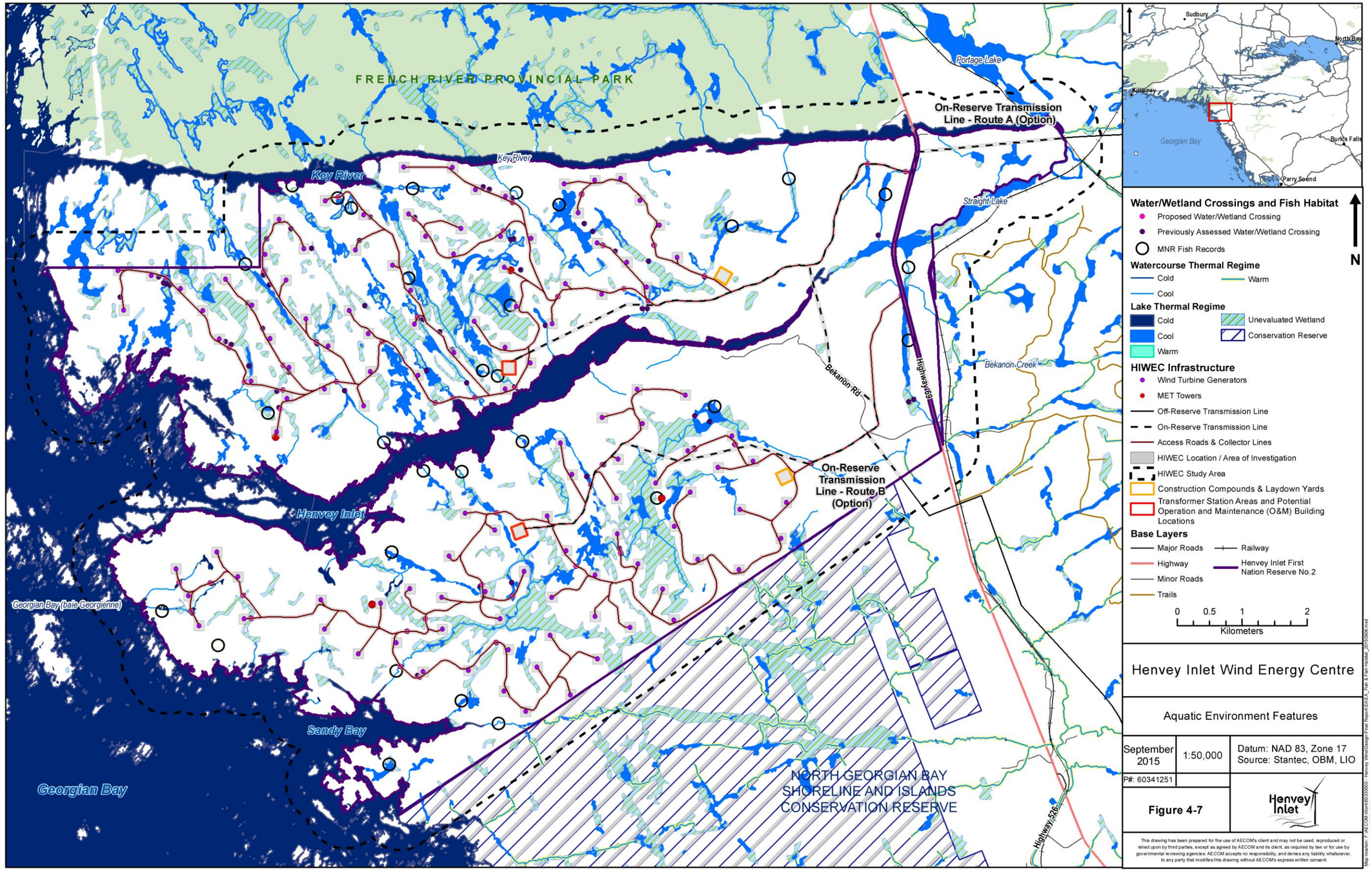
Field studies on the aquatic environment were conducted within the HIWEC study area by Tulloch Environmental in 2013. Available information regarding the aquatic component of these field studies is summarized in the following sections.

The *Nigig Power Corp/Henvey Inlet Wind Project Preliminary Environmental Constraints Analysis* (Neegan Burnside Ltd. Preliminary Report (2011)) is a preliminary review and records search conducted by Neegan Burnside Ltd. This report summarizes the findings of available data and ecological studies, including those completed by LGL in 2011, however the location of records of certain species is not always specified (i.e., whether the record came from the HIWEC study area or one (1) of the alternative off-Reserve Transmission Line routes). Given that these records are from the same geographic area as the current HIWEC study area, all species observed by LGL in 2011 as reported in the Neegan Burnside Ltd. Preliminary Report (2011) were included in the background review. Fisheries data obtained from the Neegan Burnside Ltd. Preliminary Report (2011) pertains to the coastal habitats of Georgian Bay and Henley Inlet only. This included a list of game fish species that are known to inhabit these habitats, plus mapping data indicating known game fish spawning grounds within the inlet and eastern shoreline of Georgian Bay in the vicinity of the inlet and HIWEC study area.

The focus of the site investigations conducted by Stantec in 2013 was terrestrial natural features of the HIWEC only.

Fish habitat assessments at randomly-selected sample sites of inland waterbodies were completed by Tulloch Environmental in the summer of 2013. Forty locations were randomly plotted within the HIWEC study area using a

Figure 4-7: Aquatic Environment Features



transect method. This method was used to account for all potential habitat types and at varying elevations, in order to gain a preliminary assessment of the use of inland waterbodies by fish, and the sensitivity of the fish and fish habitat of these waters. At each site the potential to directly support a fish community based on available habitat, migration barriers and connectivity and water quality was evaluated. Fish community sampling was conducted where this potential was identified, and habitat features of the assessment area were documented.

Tulloch Environmental provided raw field data and GIS data from their 2013 field season to AECOM. The data was assembled into a draft technical memo by AECOM and summarizes the results of Tulloch's field data.

4.1.4.2 Field Study Program

Field assessment of waterbodies involved visiting the potential waterbody, detailing the feature, taking photographs and documenting if water and the potential to be fish habitat was present. If water was present and the feature was deemed to be a potential fish-bearing waterbody, a detailed aquatic habitat assessment was completed. If no waterbody was found to be present, this information was documented and mapping was updated and noted. Waterbodies previously identified in the background review as either a permanent stream; an intermittent stream; ponds; wetland or a seepage area were confirmed or corrected based on observations made at the time of the field visit.

Watercourse study reaches were typically 100 m in length and were generally delineated starting from the centerline (CL) of any proposed access road and up to 50 m upstream and 50 m downstream of the CL. This approach allowed for a thorough characterization of the waterbody within the area most susceptible to impacts from the HIWEC.

Ten (10) waterbody features were sampled to gain further insight in addition to the background review on the fish community inventory using the aquatic habitat in the HIWEC. Fish community assessment sites and sampling gear were typically selected following the aquatic habitat assessment so that site and habitat conditions observed in the habitat assessment could assist in the selection of the fish inventory sampling sites.

The data presented in **Appendix H** is summarized in the following sections.

4.1.4.3 Surface Water

4.1.4.3.1 Waterbodies

Henvey Inlet is part of the Georgian Bay Biosphere Reserve, the Great Lakes Coastal Reserve and the Lake Huron Drainage Basin (MNRF, 2015). The Georgian Bay Biosphere includes a mixture of open waters, sheltered bays and coastal wetlands (Georgian Bay Biosphere, 2015). The Lake Huron Drainage basin covers a total area of 134,100 kilometres squared (km^2).

The Henvey Inlet waterbody itself extends the length of HIFN I.R. #2 in an east - west direction. Based on air photo imagery, topographic mapping, the background review and field observations, most of the aquatic environment of the inlet can be described as rolling, weathered bedrock shorelines and clear water ranging in depth from 1 m to 12 m. Occasional bedrock or boulder / cobble islands and shoals are present throughout the inlet. Many inland tributaries drain to Henvey Inlet, and in some areas the deposition of sediment at these outlets over time has created conditions conducive to aquatic and riparian vegetation growth; however, these areas were generally uncommon. The clear water, lack of riparian or aquatic vegetation and bedrock or coarse substrate shorelines noted throughout most of the inlet are likely attributed to the wind and water circulation throughout the inlet from its exposure to Georgian Bay. The eastern limit of the inlet is more protected from the wind and wave action of Georgian Bay by shoals, shoreline and islands. As a result, habitat features such as fine substrates, riparian and aquatic vegetation are significantly more prominent at the eastern point of the inlet.

Based on air photo imagery, topographic mapping, the background review and field observation, inland waterbodies throughout th e HIWEC study area consist mainly of an extensive network of wetlands. Extensive bedrock throughout the landscape plus the abundance of Beaver (*Castor canadensis*) activity facilitated the creation of numerous bogs, fens, open-water ponds and shallow marshes. Fens and marshes with slow-moving channels of water bordered by floating mats and emergent vegetation were most-frequently observed and are prevalent throughout the HIWEC study area. Flowing streams were only occasionally observed inland, however, more so in closer proximity and flowing to the outlets to the main watercourses bordering the HIWEC study area; as small channels flowing from Beaver dams; or flowing at elevation changes between wetlands.

A total of 55 site features were assessed in the aquatic field study program. During field studies, three (3) additional features were found, identified, and assessed for a total of 58 features.

Of the 58 features investigated:

- 31 of the assessment sites were identified as non-significant waterbodies and not fish habitat (within the area of investigation) or were identified as wetlands with no open water or ability to directly support a fish community and were therefore also classified as non-significant waterbodies.
- A total of 27 features were confirmed as significant waterbodies with the ability to directly support fish.

A summary of waterbodies in the HIWEC study area as confirmed through site investigations is provided in **Table 4-4**.

Table 4-4: Summary of Waterbodies in the HIWEC Study Area Confirmed through Site Investigations

Process Stage	Number of Waterbodies
Features identified through background review	55
Additional features identified through site investigations	3
Total sites visited for field investigations	58
Features identified as non-significant waterbodies	31
Features identified as significant waterbodies and potential fish habitat, carried forward to Effects Assessment	27
Features identified as groundwater seeps	12

4.1.4.3.2 Drainage

Surface drainage of inland waters within the HIWEC study area is generally directed northwest to the Key River and Henvey Inlet, and westward towards Georgian Bay. Surface water features where local drainage is conveyed to are common across the site given the complex topography of the site and its rocky nature. Elevation ranges from approximately 230 mASL in the east section of the HIWEC study area to approximately 170 mASL at the most westerly portion of the HIWEC study area near Georgian Bay. Based on correspondence and data provided by Tulloch Environmental, the water quality observed at a significant portion of the inland waterbodies was found to have lower than average dissolved oxygen and pH readings. This is commonly observed in bog and fen-type environments.

4.1.4.4 Fish and Fish Habitat

During the summer of 2013, Tulloch Environmental conducted fish habitat assessment surveys at 40 site locations throughout the HIWEC study area, of which 36 sites were sampled for fish. Raw data provided by Tulloch Environmental and discussions with (former) Tulloch biologists, local residents and direct observation has provided general insight on the dominant aquatic vegetation communities observed at these sites (i.e., submergent, emergent or floating), the total percent of aquatic vegetation cover and habitat types within the HIWEC study area. Information and general observations from these sources were substantiated by AECOM field studies in 2015 and are summarized in the following sections.

4.1.4.4.1 Aquatic Vegetation

Natural wetland habitats (e.g., fens) and areas that had converted to wetlands due to Beaver activity were prevalent in the HIWEC study area. The dominant vegetation type observed at the bog and fen habitats was floating mats, with species typical of these low pH habitat such as Sweet Gale (*Myrica gale*), Bog Rosemary (*Andromeda polifolia*), Sheep Laurel (*Kalmia angustifolia*), Bog laurel (*Kalmia polifolia*), Sphagnum mosses (*Sphagnum* sp.), Large Cranberry (*Vaccinium macrocarpon*), Tamarack, and Pitcher Plant (*Sarracenia purpurea*).

Ponds of open water with bedrock shorelines and bedrock-boulder substrates with a significant component of detritus and muck were also frequently observed throughout the HIWEC study area, such as the mixed wetland at the Key River. Emergent, submergent and floating aquatic vegetation typical of these habitat were commonly observed, such as Yellow Pondlily (*Nuphar variegate*), Fragrant Water Lilly (*Nymphaea odorata*), Pondweeds (*Potamogeton sp*.), Bladderwort (*Utricularia sp*.), cattails (*Typha sp*.), and Milfoil (*Myriophyllum sp*.).

The southern edge of Straight Lake consists of emergent and submergent aquatic vegetation. Barren sand substrate dominates the central portion and continues for two-thirds of the lake with depths up to 4.5 m. Submergent vegetation begins to appear at about 130 m from the south shore of the lake. As the north shore is approached, the submergent and emergent vegetation is present.

4.1.4.4.2 Fish and Fish Habitat

A variety of aquatic habitats throughout the inland waterbodies, bordering rivers (Key River and Henvey Inlet) and coastal shorelines are present throughout the HIWEC study area, and support mainly warm and coolwater fish communities.

The Henvey Inlet watercourse is classified as cold water fish habitat until approximately 5 km west of Highway 69 where the thermal regime is unknown (Neegan Burnside Ltd. Preliminary Report (2011)). As a tributary to Georgian Bay, Henvey Inlet has the potential to support numerous fish species. **Table 4-5** is a compilation of fish known to inhabit Henvey Inlet. This information is collected from data provided in the Neegan Burnside Ltd. Preliminary Report (2011), DFO Fisheries Protection Program biologist Véronique D'Amours Gauthier and direct observation.

Table 4-5: Fish Likely or Known to Inhabit Henvey Inlet

Common Name	Scientific Name
Alewife	*Alosa pseudoharengus*
Lake Trout	*Salvelinus namaycush*
Lake Whitefish	*Coregonus clupeaformis*
Cisco	*Coregonus artedi*
Smallmouth Bass	*Micropterus dolomieu*
Black Crappie	*Pomoxis nigromaculatus*
Walleye	*Sander vitreus*
Johnny Darter	*Etheostoma nigrum*
Blacknose Shiner	*Notropis heterolepis*
Bluntnose Minnow	*Pimephales notatus*
Bowfin	*Amia calva*
Brook Trout	*Salvelinus fontinalis*
Brown Bullhead	*Ameiurus nebulosus*
Central Mudminnow	*Umbra limi*
Common Shiner	*Luxilus cornutus*
Creek Chub	*Semotilus atromaculatus*
Fathead Minnow	*Pimephales promelas*
Finescale Dace	*Chrosomus neogaeus*

Common Name	Scientific Name
Northern Pike	*Esox lucius*
Muskellunge	*Esox masquinongy*
Channel Catfish	*Ictalurus punctatus*
Rock Bass	*Ambloplites rupestris*
Largemouth Bass	*Micropterus salmoides*
Yellow Perch	*Perca flavescens*
White Bass	*Morone chrysops*
Logperch	*Percina caprodes*
Iowa Darter	*Etheostoma exile*
Northern Redbelly Dace	*Chrosomus eos*
Pearl Dace	*Margariscus margarita*
Pumpkinseed	*Lepomis gibbosus*
Sea Lamprey	*Petromyzon marinus*
Golden Shiner	*Notemigonus crysoleucas*
Spottail Shiner	*Notropis hudsonius*
Sucker sp.	*Catostomus sp.*
White Sucker	*Catostomus commersonii*

The Neegan Burnside Ltd. Preliminary Report (2011) also identified known Walleye and Northern Pike spawning habitat in Henvey Inlet. Coarse substrates (boulder / cobble) aerated by circulating water preferred by Walleye (Scott and Crossman, 1985) and narrow emergent vegetation in sheltered bays with clear water preferred by Northern Pike (Scott and Crossman, 1985) were noted using air photo imagery and general field observations. Suitable spawning habitat for these fish, especially Northern Pike, was also noted throughout the Key River in the background review and 2015 field studies (AECOM 2015).

During 2015 field studies, an extensive marsh wetland complex with suitable spawning habitat features for Northern Pike was noted in the southern portion of the HIWEC study area. This habitat is likely to be accessible to Northern Pike from a watercourse flowing westerly from the wetland to Georgian Bay. Where this watercourse was assessed in detail at the proposed access road crossing, suitable spawning and nursery habitat was also noted for Northern Brook Lamprey (*Ichthyomyzon fossor*).

Raw fish collection data was provided by Tulloch Environmental. **Table 4-6** is a compilation of fish observed during field investigations conducted by Tulloch Environmental, 2013 and AECOM, 2015.

Table 4-6: Fish Community of Inland Waterbodies, and Tributary Outlets to Henvey Inlet and Key River

Common Name	Scientific Name
Northern Redbelly Dace	*Chrosomus neogaeus*
Central Mudminnow	*Umbra limi*
Common Shiner	*Luxilus cornutus*
Sand Shiner	*Notropis stramineus*
Brook Stickleback	*Culaea inconstans*
Pumpkinseed	*Lepomis gibbosus*
Iowa Darter	*Etheostoma exile*

Common Name	Scientific Name
Finescale Dace	*Chrosomus eos*
Brown Bullhead	*Ameiurus nebulosus*
Golden Shiner	*Notemigonus crysoleucas*
Fathead Minnow	*Pimephales promelas*
Rock Bass	*Ambloplites rupestris*
Black Crappie	*Pomoxis nigromaculatus*

4.1.5 Species at Risk

Species protected under the federal *SARA* and provincial *ESA* are addressed in the following sections.

4.1.5.1 Federal

4.1.5.1.1 Terrestrial Species at Risk

Species listed as Endangered or Threatened under Schedule 1 of the *SARA* are protected on HIFN I.R. #2 and may require permits and / or authorization administered by EC-CWS if the proposed HIWEC activities are likely to contravene the general or critical habitat prohibition provisions under the *Act* (to be determined in consultation with EC-CWS). According to *SARA*, critical habitat is defined as “the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species’ critical habitat in the recovery strategy or in an action plan for the species”. For those species that have critical habitats defined in final recovery strategies or action plans, their critical habitats are protected under SARA and are assessed for potential environmental effects in **Section 6**. A total of 18 federally protected species, including four (4) Endangered species, 13 Threatened, and one (1) restricted species[3], were identified as occurring or having the potential to occur within the HIWEC study area through the background review (refer to **Appendix F1**). These are summarized in **Table 4-7**. Of these, 14 species were recorded within the HIWEC study area between 2011 and 2015.

3. *Records of SAR considered to be restricted are not being made public due to the threat of poaching experienced by these species. These records will be provided under a separate cover to EC-CWS for permitting purposes.*

Table 4-7. Federal Terrestrial Species at Risk Potentially Occurring in the HIWEC Study Area

Common Name	Scientific Name	S-rank[1]	ESA Status[2]	COSEWIC Status[3]	SARA Status[4]	Observation Year			
						2011 / 2012	2013	2014	2015
Amphibian Species (1)									
Western Chorus Frog (Great Lakes / St. Lawrence – Canadian Shield Population)	*Pseudacris triseriata pop. 1*	S3	NAR	THR	THR (Schedule 1)	Possibly but not confirmed	Possibly but not confirmed	No	No
Bird Species (8)									
Canada Warbler	*Cardellina pusilla*	S4	SC	THR	THR (Schedule 1)	Yes	Yes	No	Yes
Chimney Swift	*Chaetura pelagica*	S4	THR	THR	THR (Schedule 1)	Yes	No	No	No
Common Nighthawk	*Chordeiles minor*	S4	SC	THR	THR (Schedule 1)	Yes	Yes	No	Yes
Eastern Whip-poor-will	*Anstrostomus vociferus*	S4	THR	THR	THR (Schedule 1)	Yes	Yes	No	Yes
Golden-winged Warbler	*Vermivora chrysoptera*	S4	SC	THR	THR (Schedule 1)	No	No	No	No
Kirtland's Warbler	*Setophaga kirtlandii*	S1	END	END	END (Schedule 1)	No	No	No	Yes
Least Bittern	*Ixobrychus exilis*	S4	THR	THR	THR (Schedule 1)	No	No	No	No
Olive-sided Flycatcher	*Contopus borealis*	S4	SC	THR	THR (Schedule 1)	Yes	Yes	No	Yes
Mammal Species (3)									
Little Brown Bat	*Myotis lucifugus*	S4	END	END	END (Schedule 1)	Yes	Yes	No	No
Northern Myotis Bat	*Myotis septentrionalis*	S4	END	END	END (Schedule 1)	Yes	Yes	No	No
Tri-coloured Bat	*Perimyotis subflavus*	S3?	END	END	END (Schedule 1)	Yes	Yes	No	No
Plant Species (1)									
Branched Bartonia	*Bartonia paniculata*	S1	THR	THR	THR (Schedule 1)	No	No	No	Presence / absence to be confirmed September 2015
Reptile Species (5)									
Blanding's Turtle	*Emydoidea blandingii*	S3	THR	THR	THR (Schedule 1)	Yes	Yes	No	Yes
Eastern Foxsnake (Georgian Bay population)	*Pantherophis gloydi pop. 1*	S3	THR	END	END (Schedule 1)	Yes	Yes	No	No
Eastern Hog-nosed Snake	*Heterodon platirhinos*	S3	THR	THR	THR (Schedule 1)	No	No	No	No
Eastern Musk Turtle	*Sternotherus odoratus*	S3	SC	SC[5]	THR (Schedule 1)	Yes	No	No	No
Massasauga Rattlesnake (Great Lakes / St. Lawrence population)	*Sistrurus catenatus pop. 1*	S3	THR	Non-Active	THR (Schedule 1)	Yes	Yes	Yes	Yes
Restricted Species (1)									
One (1) species	-	-	-	-		Yes	Yes	No	Yes

Notes 1, 2, 3, 4, 5: See Notes at the end of Section 4.1

Although Branched Bartonia is only known from 17 sites in Ontario within the Muskoka and Parry Sound Districts, which are located more than 80 km away from the HIWEC study area, MNRF Parry Sound District (personal communication, June 29, 2015) and EC-CWS (personal communication, August 4, 2015) indicated that there is potential for this species to occur within the HIWEC study area, and therefore the species is included in **Table 4-7**. Species-specific surveys to confirm the presence / absence of this species within the HIWEC study area were completed in the fall of 2015.

In addition to the species identified through the background review, Kirtland's Warbler was observed during field studies completed in the HIWEC study area in 2015. This species is also included in **Table 4-7**.

The following federal SAR were confirmed to occur within the HIWEC study area through the baseline field studies completed between 2011 and 2015:

4.1.5.1.1.1 Canada Warbler

Canada Warbler is a small passerine that migrates from South America to breed primarily in southern Canada. This species prefers to breed in moist interior-forest habitat with a deciduous or mixed canopy and a well-developed shrub layer (EC, 2015a). The decline in Canada Warbler has been attributed to habitat loss and degradation occurring in both the species' breeding and wintering range, as well as reduced availability of insect prey (EC, 2015a).

The HIWEC study area, particularly the easternmost portion, contains moist mixed woods or deciduous forest habitats considered suitable for Canada Warbler (refer to **Appendix F2**). The occurrence of this species in the HIWEC study area was documented during daytime breeding bird surveys conducted in 2011, 2012, 2013 and 2015. The methods and results of the 2011, 2012 and 2013 survey are described in detail in the *Summary of 2011, 2012 and 2013 Breeding Bird Surveys – Henvey Inlet Wind Energy Centre Study Area* (refer to Appendix A of **Appendix F1**). Breeding bird surveys were also completed in 2015; the methods and results of these surveys are described in detail in the NHA: Evaluation of Importance Report (refer to **Appendix F3**). Numerous occurrences of Canada Warbler were recorded throughout the HIWEC study area. The locations where Canada Warbler was observed within the HIWEC study area in 2011, 2012, 2013 and 2015 are mapped on Figure 3-2 of the NHA: Evaluation of Importance Report (refer to **Appendix F3** Critical habitat for this species is currently not defined in the *Proposed Recovery Strategy for Canada Warbler (Cardellina canadensis) in Canada* (EC, 2015a) and therefore, potential environmental effects on critical habitat for this SAR are assessed in Section 6 by determining effects to suitable habitat. This approach provides a more conservative estimate of potential impacts since critical habitat is a smaller subset of suitable habitat.

4.1.5.1.1.2 Common Nighthawk

Common Nighthawk is a nocturnal aerial insectivore that breeds throughout most of North and Central America and winters in the northeastern half of South America. Common Nighthawk foraging and breeding habitat includes a wide variety of open habitats that are natural (such as beaches, forest clearings, short-grass prairies, peatbogs, marshes, rock barrens, and the shores of rivers and lakes) as well as anthropogenic (such as recently logged areas, pastures, gravel roads, quarries, recent burns, military bases and commercial blueberry fields) (Peck and James, 1983; Gauthier and Aubry, 1996; Poulin, et al. 1996; Manitoba Avian Research Committee, 2003). The extent to which each potential threat is contributing to population declines in Common Nighthawk is unknown; however, reduced insect prey availability, habitat loss and degradation, and climate change are likely important as in other aerial insectivores (EC, 2015b).

An extensive proportion of the HIWEC study area contains partially open habitats considered suitable for Common Nighthawk (refer to **Appendix F2**). The occurrence of this species in the HIWEC study area was documented

through crepuscular breeding bird surveys conducted in 2011, 2013 and 2015. The methods and results of the 2011 and 2013 surveys are described in detail in the *Summary of 2011, 2012 and 2013 Breeding Bird Surveys – Henvey Inlet Wind Energy Centre Study Area* (refer to Appendix A of **Appendix F1**). The methods and results of the 2015 surveys are described in detail in the NHA: Evaluation of Importance Report (refer to **Appendix F3**). These field studies confirmed that Common Nighthawks are present throughout the HIWEC study area. The locations where Common Nighthawk was observed within the HIWEC study area in 2011, 2013 and 2015 are mapped on Figure 3-3 of the NHA: Evaluation of Importance Report (refer to **Appendix F3**). Critical habitat for this species is currently not defined in the *Proposed Recovery Strategy for Common Nighthawk (Chordeiles minor) in Canada* (EC, 2015b) and therefore, potential environmental effects on critical habitat for this SAR are assessed in Section 6 by determining effects to suitable habitat. This approach provides a more conservative estimate of potential impacts since critical habitat is a smaller subset of suitable habitat.

4.1.5.1.1.3 Eastern Whip-poor-will

Eastern Whip-poor-will is a nocturnal aerial insectivore that breeds in eastern North America and winters in southern United States and Central America. Eastern Whip-poor-wills avoid both wide-open areas as well as dense forest, instead preferring habitat mosaics such as rock or sand barrens with scattered trees, savannahs, old burns or other disturbed sites in a state of early to mid-forest succession, or open conifer plantations (Bushman and Therres, 1988; Mills, 1987; Cink, 2002). The main threats to Eastern Whip-poor-will include reduced availability of insect prey, and habitat loss and degradation (COSEWIC, 2009). Continued agricultural intensification, urban development, and resource extraction have likely contributed to the loss of previously forested habitats suitable for nesting (COSEWIC, 2009). Another factor implicated in the decline of this species is reforestation of formerly open foraging habitats due to forest fire suppression and succession of native grasslands or abandoned agricultural lands (Cink, 2002).

The majority of the HIWEC study area contains partially open habitats considered suitable for Eastern Whip-poor-will (refer to **Appendix F2**). The occurrence of this species in the HIWEC study area was documented through crepuscular breeding bird surveys completed in 2011, 2013 and 2015. The methods and results of these surveys are described in detail in the *Summary of 2011, 2012 and 2013 Breeding Bird Surveys – Henvey Inlet Wind Energy Centre Study Area* (refer to Appendix A of **Appendix F1**) and in the NHA: Evaluation of Importance Report (refer to **Appendix F3**). Eastern Whip-poor-will was confirmed to be breeding throughout the HIWEC study area through these surveys. The locations where Eastern Whip-poor-will was observed within the HIWEC study area in 2011, 2013 and 2015 are mapped on Figure 3-5 of the NHA: Evaluation of Importance Report (refer to **Appendix F3**).

Critical habitat for this species is currently proposed in the *Proposed Recovery Strategy for Eastern Whip-poor-will (Antrostomus vociferus) in Canada* (EC, 2015c) but is not considered as final; therefore, potential environmental effects on critical habitat for this SAR are assessed in Section 6 by determining effects to suitable habitat. This approach provides a more conservative estimate of potential impacts since critical habitat is a smaller subset of suitable habitat.

4.1.5.1.1.4 Olive-sided Flycatcher

Olive-sided Flycatcher is a medium-sized passerine that, in Canada, is widely distributed in conifer or mixed forests. Olive-sided Flycatcher prefers forest clearings near water or wetlands (Cheskey, 2007; Altman and Sallabanks, 2012) and requires tall snags or live trees from which to sally for insect prey and advertise territory (Brandy, 2001; Altman and Sallabanks, 2012). Similar to other aerial insectivores, Olive-sided Flycatcher may be declining due to reduced availability of insect prey and habitat loss.

The HIWEC study area contains potentially suitable Olive-sided Flycatcher habitat including treed bogs, coniferous swamps, mixed forests and coniferous forests vegetation communities that have a tree layer with an abundance of snags (refer to **Appendix F2**). The occurrence of this species in the HIWEC study area was documented during

daytime breeding bird surveys conducted in 2011, 2012, 2013 and 2015. The methods and results of the 2011, 2012 and 2013 surveys are described in detail in the *Summary of 2011, 2012 and 2013 Breeding Bird Surveys – Henvey Inlet Wind Energy Centre Study Area* (refer to Appendix A of **Appendix F1**). Breeding bird surveys were also completed in 2015; the methods and results of these surveys are described in detail in the NHA: Evaluation of Importance Report (refer to **Appendix F3**). Olive-sided Flycatcher was encountered on several occasions during these field surveys. The locations where Olive-sided Flycatcher was observed within the HIWEC study area in 2011, 2012, 2013 and 2015 are mapped on Figure 3-4 of the NHA: Evaluation of Importance Report (refer to **Appendix F3**). Critical habitat for this species is currently not defined in the *Proposed Recovery Strategy for Olive-sided Flycatcher (Contopus cooperi) in Canada* (EC, 2015d) and therefore, potential environmental effects on critical habitat for this SAR are assessed in Section 6 by determining effects to suitable habitat. This approach provides a more conservative estimate of potential impacts since critical habitat is a smaller subset of suitable habitat.

4.1.5.1.1.5 Kirtland's Warbler

Kirtland's Warbler is a globally rare songbird that breeds mainly in the United States, in the Upper and Lower Peninsulas of Michigan, and was recently discovered in Wisconsin. It is only known from one (1) place in Canada, where nesting was confirmed near Petawawa, Ontario (Government of Canada, 2014). It is the only bird species in North America to exclusively depend on young Jack Pine stands (COSEWIC, 2008a). This extreme habitat specialization plays an important role in limiting the recovery of the species from population declines. The dense, young (7 to 20 years old) Jack Pine stands that this species requires for breeding (stands with at least 3,500 stems / ha, 35-65% canopy cover, and high foliage volume are preferred) are the generally result of post-fire or post-harvest regeneration (COSEWIC, 2008a; Probst, 1988; Kepler, *et al.* 1996). The species is also area-sensitive, being unable to breed in patches smaller than 30 ha, and experiencing higher breeding success in patches that exceed 200 ha (Mayfield, 1992). Reduced habitat quality from processes that are known to decrease the abundance of the young Jack Pine stands (such as natural succession and fire suppression) that are required by Kirtland's Warblers can contribute to decreased breeding success (COSEWIC, 2008a). Habitat loss and fragmentation due to the conversion of Jack Pine barrens to agriculture, forestry, and human development (COSEWIC, 2008a), leads to increases in the number of smaller habitat patches, which are relatively unsuitable for Kirtland's Warblers which, as an area sensitive species, requires large tracts of habitat to breed successfully (Mayfield, 1992).

Much of the HIWEC study area contains open, shrub or treed rock barren habitats larger than 30 ha in size considered suitable for Kirtland's Warbler (refer to **Appendix F2**). Kirtland's Warbler was not recorded during any of the breeding bird surveys conducted in 2011, 2012, 2013 and 2015; however, it was incidentally recorded in 2015 on three (3) separate occasions by three (3) Avian Biologists while walking in between sites for various other surveys (refer to **Appendix F3**). On June 15, 2015, a male and female Kirtland's Warbler were observed. The male was singing repeatedly and responded to a call broadcast. On June 19, 2015, a male was observed singing. On June 26, 2015, a singing male was observed before flying off and then returning after five (5) minutes. These observations all occurred within the same general location and habitat in the northern part of the HIWEC study area. It is therefore assumed that all three (3) observations were of the same Kirtland's Warblers, whether it was just the male or both the male and female together. Critical habitat for this species is currently not defined in the *Recovery Strategy for Kirtland's Warbler (Dendroica kirtlandii) in Canada* (EC, 2006) and therefore, potential environmental effects on critical habitat for this SAR are assessed in Section 6 by determining effects to suitable habitat. This approach provides a more conservative estimate of potential impacts since critical habitat is a smaller subset of suitable habitat.

4.1.5.1.1.6 Little Brown Bat

Little Brown Bat is distributed over much of North America and is widespread in Canada. The habitat required by this species consists of hibernacula and foraging habitat adjacent to structures used for roosting or maternity colonies (COSEWIC, 2013). This species will hibernate in caves and mines, and populations are vulnerable to White-nose Syndrome, a dermal fungal infection. White-nose Syndrome compromises adult survival by stressing

fat reserves when irritation resulting from the infection disturbs hibernating individuals (Warnecke, *et al*. 2012 and 2013; Brownlee-Bouboulis and Reeder, 2013). Little Brown Bat roosts (including maternity roosts) are most often found in and around man-made structures (e.g., attics, barns) although they can also be found in tree hollows, under bark and within rock crevices (Fenton and Barclay, 1980).

The HIWEC study area contains potentially suitable Little Brown Bat habitat including forest and swamp vegetation communities that may contain cavity trees suitable for roosting or maternity colonies, as well as rock barrens, fens, bogs, marshes, cultural woodland, open water and shallow water vegetating communities for foraging habitat (refer to **Appendix F2**). The occurrence of this species in the HIWEC study area was documented through acoustic monitoring surveys completed in 2011, 2012 and 2013. The methods and results of these surveys are described in detail in the *Summary of 2011, 2012 and 2013 Bat Acoustic Monitoring Surveys – Henvey Inlet Wind Energy Centre Study Area* (refer to Appendix A of **Appendix F1**). This species was recorded within the HIWEC study area in 2011 and 2012, and was potentially present in 2013 based on the results of these surveys. The recovery strategy for this species has not been posted yet and therefore, potential environmental effects on critical habitat for this species are assessed in Section 6 by determining effects to suitable habitat. This approach provides a more conservative estimate of potential impacts since critical habitat is a smaller subset of suitable habitat.

4.1.5.1.1.7 Northern Myotis

The range of Northern Myotis Bat is similar to, although less extensive than, Little Brown Bat. The habitat required by this species consists of hibernacula and foraging habitat adjacent to structures used for roosting or maternity colonies (COSEWIC, 2013). This species will hibernate in caves and mines, and populations are vulnerable to White-nose Syndrome. Northern Myotis is considered a forest-dwelling species and prefers to roost in deciduous trees of a mid-decay class that are generally larger and taller than surrounding trees (Owen, *et al*. 2002; Jung, *et al*. 2004; Crampton and Barclay, 2008; Foster and Kurta, 1999).

The HIWEC study area contains potentially suitable Northern Myotis habitat including forest and swamp vegetation communities that may contain cavity trees suitable for roosting or maternity colonies, as well as rock barrens, fens, bogs, marshes, cultural woodland, open water and shallow water vegetating communities for foraging habitat (refer to **Appendix F2**). The occurrence of this species in the HIWEC study area was documented through acoustic monitoring surveys completed in 2011, 2012 and 2013. The methods and results of these surveys are described in detail in the *Summary of 2011, 2012 and 2013 Bat Acoustic Monitoring Surveys – Henvey Inlet Wind Energy Centre Study Area* (refer to Appendix A of **Appendix F1**). This species was recorded within the HIWEC study area in 2011 and 2012, and was potentially present in 2013 based on the results of these surveys. The recovery strategy for this species has not been posted yet and therefore, potential environmental effects on critical habitat for this species are assessed in Section 6 by determining effects to suitable habitat. This approach provides a more conservative estimate of potential impacts since critical habitat is a smaller subset of suitable habitat.

4.1.5.1.1.8 Tri-coloured Bat

Tri-coloured Bat occurs in eastern North America although the species is restricted in Canada to the southern portion of eastern provinces no further west than central Ontario. The habitat required by this species consists of hibernacula and foraging habitat adjacent to structures used for roosting or maternity colonies (COSEWIC, 2013). This species will hibernate in caves and mines, and populations are vulnerable to White-nose Syndrome. There is limited information regarding the roosting habits of Tri-colored Bats. Tri-colored Bat maternity roosts have been found in dead foliage of mature trees (Veilleux, *et al.* 2003) and manmade structures and caves (Humphrey, 1975; Jones and Pagels, 1968).

The HIWEC study area contains potentially suitable Tri-colored Bat habitat including forest and swamp vegetation communities that may contain cavity trees suitable for roosting or maternity colonies as well as rock barrens, fens,

bogs, marshes, cultural woodland, open water and shallow water vegetating communities for foraging habitat (refer to **Appendix F2**). The occurrence of this species in the HIWEC study area was documented through acoustic monitoring surveys completed in 2011, 2012 and 2013. The methods and results of these surveys are described in detail in the *Summary of 2011, 2012 and 2013 Bat Acoustic Monitoring Surveys – Henvey Inlet Wind Energy Centre Study Area* (refer to Appendix A of **Appendix F1**). This species was recorded within the HIWEC study area in 2011 and 2012, and was potentially present in 2013 based on the results of these surveys. The recovery strategy for this species has not been posted yet and therefore, potential environmental effects on critical habitat for this species are assessed in Section 6 by determining effects to suitable habitat. This approach provides a more conservative estimate of potential impacts since critical habitat is a smaller subset of suitable habitat.

4.1.5.1.1.9 Blanding's Turtle

The range of Blanding's Turtle is centred on the Great Lakes region of North America. Blanding's Turtles require a variety of habitat to complete their annual cycle. The preferred habitat of this species is characterized by shallow water with a deep organic substrate and dense aquatic vegetation (Ernst, *et al*. 1994; Herman, *et al*. 1995). Blanding's Turtles also require exposed substrate for nesting and movement corridors (Parks Canada, 2010). Blanding's Turtle is affected by the development of wetlands and the terrestrial ecosystems that surround them, which results in fragmentation and isolation of populations, preventing any natural 'rescue effect' from other populations (COSEWIC, 2005). Furthermore, expanding road networks and increased vehicle morality are likely reducing adult survival and thereby contributing to population decline of this long-lived species (Parks Canada 2010).

The HIWEC study area contains suitable habitat for Blanding's Turtle including potential turtle wintering and nesting areas, as well as wetlands (refer to **Appendix F2**). The occurrence of this species in the HIWEC study area was documented through herpetological surveys completed in 2011, 2012 and 2013, turtle basking surveys conducted in 2015, as well as incidental wildlife observations between 2011 and 2015. The methods and results of the 2011, 2012 and 2013 herpetological surveys and incidental observations of this species are described in detail in the *Summary of 2011, 2012 and 2013 Herpetological Surveys – Henvey Inlet Wind Energy Centre Study Area* (refer to Appendix A of **Appendix F1**). The methods and results of the 2015 turtle basking surveys are described in detail in the NHA: Evaluation of Importance Report (refer to **Appendix F3**). Blanding's Turtles were frequently observed in the HIWEC study area, concentrated around areas that contain standing water. The locations where Blanding's Turtles were observed in 2011, 2012, 2013 and 2015 through either targeted surveys or incidental wildlife observation are mapped on Figure 3-6 of the NHA: Evaluation of Importance Report (refer to **Appendix F3**). Currently, critical habitat for Blanding's Turtles only in Nova Scotia is defined in the *Draft Recovery Strategy for the Blanding's Turtle (Emydoidea blandingii), Nova Scotia population, in Canada* (Parks Canada, 2010). Therefore, potential environmental effects on critical habitat for this species in Ontario are assessed in Section 6 by determining effects to suitable habitat. This approach provides a more conservative estimate of potential impacts since critical habitat is a smaller subset of suitable habitat.

4.1.5.1.1.10 Eastern Foxsnake

The Eastern Foxsnake is restricted to the province of Ontario within Canada, where it occurs in two (2) different regions: the eastern Georgian Bay area and the Carolinian forest region (Eastern Foxsnake Recovery Team, 2015). Eastern Foxsnake, like other snakes found within the HIWEC study area, requires habitat for a variety of life processes including hibernation, foraging, thermo-regulating, and oviposition (Eastern Foxsnake Recovery Team, 2015). This species is typically associated with unforested habitats such as old fields, shorelines, rock barrens and marshes. Eastern Foxsnakes hibernate communally in fissured bedrock, and animal burrows. In the Georgian Bay area, oviposition often occurs in rock crevices. This species is highly associated with shorelines and, in the Georgian Bay area, is generally found within 1 km of the Bay (COSEWIC, 2008b). The availability of habitat in the eastern Georgian Bay area has not declined to the extent of the Carolinian population; however, increasing development pressures in this region have resulted in a reduction of suitable habitat (COSEWIC, 2008b).

The HIWEC study area contains suitable habitat for Eastern Foxsnake including potential reptile hibernacula within 1 km of Georgian Bay, Key River and Henvey Inlet (refer to **Appendix F2**). The occurrence of this species in the HIWEC study area was documented through herpetological surveys completed in 2011, 2012 and 2013, snake basking surveys conducted in 2015, as well as incidental wildlife observations between 2011 and 2015. The methods and results of the 2011, 2012 and 2013 herpetological surveys and incidental observations of this species are described in detail in the *Summary of 2011, 2012 and 2013 Herpetological Surveys – Henvey Inlet Wind Energy Centre Study Area* (refer to Appendix A of **Appendix F1**). The methods and results of the 2015 snake basking surveys are described in detail in the NHA: Evaluation of Importance Report (refer to **Appendix F3**). Three (3) Eastern Foxsnakes were recorded within or in the vicinity of the HIWEC study area during these field studies. One (1) Eastern Foxsnake was recorded near the shoreline of Key River in 2011, one (1) was recorded along the shoreline of Georgian Bay in 2013 and one (1) was recorded on Sandy Bay along the shoreline of Georgian Bay in 2015 (refer to **Appendix F3**). The recovery strategy for this species has not been posted yet and therefore, potential environmental effects on critical habitat for this species are assessed in Section 6 by determining effects to suitable habitat. This approach provides a more conservative estimate of potential impacts since critical habitat is a smaller subset of suitable habitat.

4.1.5.1.1.11 Eastern Hog-nosed Snake

The Eastern Hog-nosed Snake is typically found in sandy upland fields, pastures, savannahs, sandy beaches, as well as dry open oak-pine-maple forest with sandy soils. Eastern Hog-nosed Snakes generally prefer forest areas greater than 5 ha in size (MNRF, 2000). A telemetry study completed near Parry Sound suggests that Eastern Hog-nosed Snakes in the area prefer meadow, sand, human-impacted areas and forest habitats over rock, wetland, and aquatic habitats (COSEWIC, 2007b). The Eastern Hog-nosed Snake is a prey specialist therefore the abundance of American Toads is also an important factor in identifying habitat for this species (COSEWIC, 2007b). Eastern Hog-nosed Snakes nest and hibernate in areas of sandy substrate (COSEWIC, 2007b; Ontario Nature, 2014).

The HIWEC study area contains suitable habitat for Eastern Hog-nosed Snake including two (2) sand barren vegetation communities which could be used by this species for nesting or hibernation (refer to **Appendix F2**). The occurrence of this species in the HIWEC study area was investigated through herpetological surveys completed in 2011, 2012 and 2013, snake basking surveys conducted in 2015, as well as incidental wildlife observations between 2011 and 2015. The methods and results of the 2011, 2012 and 2013 herpetological surveys are described in detail in the *Summary of 2011, 2012 and 2013 Herpetological Surveys – Henvey Inlet Wind Energy Centre Study Area* (refer to Appendix A of **Appendix F1**). The methods and results of the 2015 snake basking surveys are described in the NHA: Evaluation of Importance Report (refer to **Appendix F3**). Although Eastern Hog-nosed Snake was not recorded within the HIWEC study area during any year, this species is very difficult to find through targeted surveys even when present; therefore, the presence / absence of this species could not be confirmed but it is assumed to be present. Critical habitat for this species is currently not defined in the *Recovery Strategy for the Eastern Hog-nosed Snake (Heterodon platirhinos) in Canada* (Seburn, 2008) and therefore, potential environmental effects on critical habitat for this species are assessed in Section 6 by determining effects to suitable habitat. This approach provides a more conservative estimate of potential impacts since critical habitat is a smaller subset of suitable habitat.

4.1.5.1.1.12 Eastern Musk Turtle

The Eastern Musk Turtle prefers habitats that contain shallow water (< 2 m deep) with an abundance of floating and submerged vegetation (COSEWIC, 2012a). Nesting habitat for this species of turtle is located close to shore (3 to 11 m) and occurs in decaying matter from vegetation, sand, or in the wall of muskrat and beaver lodges (COSEWIC, 2012a). Suitable habitat for this species is prevalent across most of central and eastern Ontario, especially on the Canadian Shield (COSEWIC, 2012a). Although the habitat for this species is prevalent within the region of the HIWEC study area, the most significant threat to the Eastern Musk Turtle remains to be habitat destruction and alteration (COSEWIC, 2012a).

The HIWEC study area contains suitable habitat for Eastern Musk Turtle including potential turtle wintering and nesting areas, as well as wetlands (refer to **Appendix F2**). The occurrence of this species in the HIWEC study area was documented through herpetological surveys completed in 2011, 2012 and 2013, turtle basking surveys conducted in 2015, as well as incidental wildlife observations between 2011 and 2015. The methods and results of the 2011, 2012 and 2013 herpetological surveys and incidental observations of this species are described in detail in the *Summary of 2011, 2012 and 2013 Herpetological Surveys – Henvey Inlet Wind Energy Centre Study Area* (refer to Appendix A of **Appendix F1**). The methods and results of the 2015 turtle basking surveys are described in detail in the NHA: Evaluation of Importance Report (refer to **Appendix F3**). Between 2011 and 2015, there was one (1) observation of an Eastern Musk Turtle, recorded as road kill, in the vicinity of the HIWEC study area. The recovery strategy for this species has not been posted yet therefore, potential environmental effects on critical habitat for this species are assessed in Section 6 by determining effects to suitable habitat. This approach provides a more conservative estimate of potential impacts since critical habitat is a smaller subset of suitable habitat.

4.1.5.1.1.13 Massasauga Rattlesnake

Massasauga Rattlesnake is eastern Canada's only venomous snake, occurring in the Great Lakes region of Ontario. Massasauga Rattlesnakes have three (3) essential habitat requirements: gestation sites, hibernation sites, and foraging habitat (Johnson, *et al*. 2000). The loss of habitats that provide these requirements, or prevents the movement of snakes between sites that do, is the most important determinant of population declines (COSEWIC, 2012b). Massasauga Rattlesnake habitat is currently threatened by development such as housing, golf courses, resource extraction, shoreline development for recreation and road construction (COSEWIC, 2012b).

The HIWEC study area contains suitable habitat for Massasauga Rattlesnake including potential reptile hibernacula and gestation sites (refer to **Appendix F2**). The occurrence of this species in the HIWEC study area was investigated through herpetological surveys completed in 2011, 2012 and 2013, snake basking surveys conducted in 2015, as well as incidental wildlife observations between 2011 and 2015. The methods and results of the 2011, 2012 and 2013 herpetological surveys are described in detail in the *Summary of 2011, 2012 and 2013 Herpetological Surveys – Henvey Inlet Wind Energy Centre Study Area* (refer to Appendix A of **Appendix F1**). The methods and results of the 2015 snake basking surveys are described in detail in the NHA: Evaluation of Importance Report (refer to **Appendix F3**). Numerous Massasauga Rattlesnakes were observed throughout the HIWEC study area during these field studies, primarily within extensive rock barren vegetation communities. The locations where Massasauga Rattlesnake was observed between 2011 and 2015, including incidental observations, are mapped on Figure 3-7 of the NHA: Evaluation of Importance Report (refer to **Appendix F3**). Critical habitat for this species is defined based on an occurrence-based approach, which involves applying a 1.2km radius around the centroid of an observed occurrence of Massasauga Rattlesnake, in the final *Recovery Strategy for the Massasauga (Sistrurus catenatus) in Canada* (Parks Canada Agency, 2015). Therefore, potential environmental effects on critical habitat for this species are assessed in Section 6.

The following federal SAR were determined not to occur within the HIWEC study area through the baseline field studies completed between 2011 and 2015:

4.1.5.1.1.14 Western Chorus Frog

Amphibian surveys were conducted in 2013 and 2015 to confirm the presence / absence of Western Chorus Frog in the HIWEC study. The methods and results of the 2013 amphibian surveys are described in detail in the *Summary of 2011, 2012 and 2013 Herpetological Surveys – Henvey Inlet Wind Energy Centre Study Area* (refer to Appendix A of **Appendix F1**). The methods and results of the 2015 amphibian surveys are described in detail in the NHA: Evaluation of Importance Report (refer to **Appendix F3**). Western Chorus Frog was possibly heard calling, but not confirmed in 2013. There are no records of Western Chorus Frogs in the *Ontario Reptile and Amphibian Breeding Atlas* (Ontario Nature, 2014) as far north as the HIWEC study area, so this record of the species in the

HIWEC study area is questionable. This species was not recorded during the amphibian surveys conducted throughout the HIWEC study area in 2015; therefore, it is concluded that Western Chorus Frog does not occur within the HIWEC study area.

4.1.5.1.1.15 Chimney Swift

The presence / absence of Chimney Swift in the HIWEC study area was assessed through breeding bird surveys completed in 2011, 2012, 2013 and 2015. The methods and results of the 2011, 2012 and 2013 surveys are described in detail in the *Summary of 2011, 2012 and 2013 Breeding Bird Surveys – Henvey Inlet Wind Energy Centre Study Area* (refer to Appendix A of **Appendix F1**). The methods and results of the 2015 surveys are described in detail in the NHA: Evaluation of Importance Report (refer to **Appendix F3**). Three (3) individuals of this species were recorded outside of the breeding bird season during the passerine migration surveys completed in 2012, as described in the *Summary of 2011, 2012 and 2013 Passerine Migration Surveys – Henvey Inlet Wind Energy Centre Study Area* (refer to Appendix A of **Appendix F1**); however, these individuals were likely just migrating through the HIWEC study area. According to Cadman *et al.*, (2007), the Chimney Swift is easily recognizable based on its habit of flying high above and "twittering" so it would have been easily detected through breeding bird surveys if it was breeding in the HIWEC study area. This species was not recorded during any of the breeding bird surveys completed between 2011 and 2015 and therefore it is unlikely that it breeds within the HIWEC study area.

4.1.5.1.1.16 Least Bittern

The presence / absence of Least Bittern in the HIWEC study area was assessed through breeding bird surveys and Least Bittern call playback surveys completed in 2011, 2012, 2013 and 2015. The methods and results of the 2011, 2012 and 2013 surveys are described in detail in the *Summary of 2011, 2012 and 2013 Breeding Bird Surveys – Henvey Inlet Wind Energy Centre Study Area* (refer to Appendix A of **Appendix F1**). Daytime breeding bird surveys as well as targeted Least Bittern call playback surveys were completed in 2015; the methods and results of which are described in detail in the NHA: Evaluation of Importance Report (refer to **Appendix F3**). This species was not recorded within the HIWEC study area in any surveys conducted between 2011 and 2015.

4.1.5.1.1.17 Golden-winged Warbler

The presence / absence of Golden-winged Warbler in the HIWEC study area was assessed through breeding bird surveys completed in 2011, 2012, 2013 and 2015. The methods and results of the 2011, 2012 and 2013 surveys are described in detail in the *Summary of 2011, 2012 and 2013 Breeding Bird Surveys – Henvey Inlet Wind Energy Centre Study Area* (refer to Appendix A of **Appendix F1**). The methods and results of the 2015 surveys are described in detail in the NHA: Evaluation of Importance Report (refer to **Appendix F3**). This species was not recorded within the HIWEC study area in any surveys conducted between 2011 and 2015.

4.1.5.1.1.18 Branched Bartonia

Branched Bartonia is one (1) of several Atlantic Coastal Plain Species that occur in southcentral Ontario in the Muskoka area (COSEWIC, 2003). Branched Bartonia grows in bog Ecosites with Sphagnum ground cover and peat substrate. This species is commonly associated with Tamarack and Mountain-holly (COSEWIC, 2003). Populations often grow in small clumps (COSEWIC, 2003). Based on the NHIC element occurrences, there are 17 records of Branched Bartonia in Ontario within the Muskoka and Parry Sound Districts. Although the northern-most record is >80 km south of the HIWEC study area and was last observed in 2010, MNRF Parry Sound District (personal communication, June 29, 2015) and EC-CWS (personal communication, August 4, 2015) indicated that there is potential for this species to occur within the HIWEC study area.

The presence / absence of Branched Bartonia within the HIWEC location was confirmed through species-specific surveys completed in September 2015; the methods and results of which are described in detail in the NHA:

Evaluation of Importance Report (refer to **Appendix F3**). This species was not observed in the HIWEC location through these surveys. Upon further correspondence with the MNRF Parry Sound District, it was confirmed that there are no records of this species north of Parry Sound (Jeremy Rouse, personal communication, November 5, 2015). Therefore, Branched Bartonia is confirmed to be absent from the HIWEC study area.

4.1.5.1.2 Aquatic Species at Risk

No federally protected aquatic species were identified within the HIWEC study area.

4.1.5.2 Provincial

4.1.5.2.1 Terrestrial Species at Risk

Species listed as Endangered or Threatened under the provincial *ESA* but not listed under Schedule 1 of *SARA* are treated as provincially protected species for the purpose of this EA. **Table 4-8** lists the provincially protected terrestrial species that was identified as occurring or having the potential to occur within the HIWEC study area through the background review. In total, five (5) provincial SAR, including four (4) Threatened species and one (1) Endangered species, were identified through the Records Review (refer to **Appendix F1**) as having records within the HIWEC study area and / or surrounding area. Of these, two (2) were identified as occurring or having the potential to occur within the HIWEC study area based on the background review and are summarized in **Table 4-8**. The observation year(s) of these species across all baseline field studies conducted between 2011 and 2015 are also summarized in **Table 4-8**.

Although Bobolink and Eastern Meadowlark are identified in the MNRF SAR list for Parry Sound (MNRF, 2014c), these species are considered unlikely to occur in the HIWEC study area, which does not contain any large open grassy fields, meadows or agricultural lands that could support suitable breeding habitat for these species. Golden Eagle was observed in 2011, 2012 and 2013 in the HIWEC study area; however, the species was likely just flying over, which does not indicate evidence of breeding in the area. Furthermore, the HIWEC study area is located outside of the breeding range for this species (Cadman, *et al.* 2007) and therefore the individuals observed were likely non-breeding migrants. For these reasons, these species are not included in **Table 4-8**.

Table 4-8: Provincial Terrestrial Species at Risk Potentially Occurring in the HIWEC Study Area

Common Name	Scientific Name	S-rank[1]	ESA Status[2]	COSEWIC Status[3]	SARA Status[4]	Observation Year			
						2011	2013	2014	2015
Bird Species (1)									
Barn Swallow	*Hirundo rustica*	S4	THR	THR	No Status (No Schedule)	No	No	No	No
Bank Swallow	*Riparia riparia*	S4	THR	THR	No Status (No Schedule)	No	No	No	No

Notes 1, 2, 3, 4 See Notes at the end of Section 4.1

The following provincial SAR were determined not to occur within the HIWEC study area through the baseline field studies completed between 2011 and 2015:

4.1.5.2.1.1 Barn Swallow

Barn Swallows nests in man-made structures such as barns, other buildings, houses, bridges and road culverts (COSEWIC, 2011). With the exception of a small residential section located immediately west of Highway 69 on Bekanon Road, a few private cottages located on the north side of Henvey Inlet and a few cabins, the majority of

the HIWEC study area is undeveloped. However, this species can also nest on cliffs which are present within the HIWEC study area. While cliff and talus slope features were identified during field studies completed in 2014 and 2015, no nests were observed at these locations. Furthermore, this species was not recorded during any breeding bird surveys or incidentally during any other field studies that were conducted between 2011 and 2015.

4.1.5.2.1.2 Bank Swallow

Bank Swallow was indicated by the MNRF Parry Sound District to potentially occur in the HIWEC study area (personal communication, June 29, 2015). This species prefers to nest in steep river banks composed of sand, clay or gravel, cliffs and also gravel pits (MNRF, 2000). While cliff and talus slope features were identified during field studies completed in 2014 and 2015, no nests were observed at these locations. Furthermore, this species was not recorded during any breeding bird surveys or incidentally during any other field studies that were conducted between 2011 and 2015.

4.1.5.2.2 Aquatic Species at Risk

Several resources were consulted to identify any aquatic SAR which may occur within the HIWEC study area, such as the MNRF NHIC Make-a-map web application (MNRF, 2015) and the MNRF SAR web site (MNRF, 2015), which were used to search for SAR records within any of the 1 km UTM squares that surrounded the HIWEC study area. The search resulted in one (1) provincially protected aquatic species, Lake Sturgeon (*Acipenser fulvescens*), which is currently designated as Threatened under the *ESA*. This species is also considered Rare under the SOCC, and the Great-Lakes / St. Lawrence population of Lake Sturgeon is under consideration for listing federally with the *SARA*, as summarized in **Table 4-9** below.

As Lake Sturgeon are listed as Threatened under the *ESA*, provisions for the protection of this species are determined in consultation with MNRF on lands within provincial jurisdiction. Since Lake Sturgeon is not listed under Schedule 1 of the *SARA*, there are no federal permitting requirements for the species.

The search also resulted in two (2) species designated as Special Concern which have been documented within the watershed and have the potential to occur within the HIWEC study area where suitable habitat is present. The University of Guelph *FishMAP* online tool and MNRF SAR range mapping both indicate the presence of Northern Brook Lamprey (*Ichthyomyzon fossor*) and Silver Lamprey (*Ichthyomyzon unicuspis*) in the watershed, particularly in the French River like Henvey Inlet, flows westerly into Georgian Bay on the eastern coastline. Both species are currently designated as Special Concern under the *ESA*, and the Northern Brook Lamprey is designated as Special Concern under *SARA*. Species designated as Special Concern under the *ESA* and *SARA* do not receive additional habitat protection under these Acts and therefore there are no federal permitting requirements for these species.

Table 4-9: Provincial Aquatic Species at Risk Potentially Occurring within the HIWEC Study Area

Taxon	Common Name	Scientific Name	S-Rank[1]	ESA Status[2]	COSEWIC Status[3]	SARA Schedule[4]	Year Last Observed
Fish	Lake Sturgeon (Great Lakes - Upper St. Lawrence River population)	*Acipenser fulvescens*	S2	THR	THR	Under Consideration	1990s
Fish	Northern Brook Lamprey	*Ichthyomyzon fossor*	S3	SC	SC	SC	unknown
Fish	Silver Lamprey (Great Lakes – Upper St. Lawrence population)	*Ichthyomyzon unicuspis*	S3	SC	SC	No Schedule	unknown

Notes 1, 2, 3, 4 See Notes at the end of Section 4.1

Notes for Tables 4-7 - 4-9

[1] ***S-rank:*** *The Natural Heritage provincial ranking system (provincial S-rank) is used by the MNRF Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities. Definitions are as follows:*

- *S1 Extremely rare in Ontario; usually five (5) or fewer occurrences in the province or very few remaining individuals; often especially vulnerable to extirpation.*
- *S2 Very rare in Ontario; usually between five (5) and 20 occurrences in the province or with many individuals in fewer occurrences; often susceptible to extirpation.*
- *S3 Rare to uncommon in Ontario; usually between 20 and 100 occurrences in the province; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances. Most species with an S3 rank are assigned to the watch list, unless they have a relatively high global rank.*
- *S4 Common and apparently secure in Ontario; usually with more than 100 occurrences in the province.*
- *S5 Very common and demonstrably secure in Ontario.*
- *SH Possibly Extirpated (Historical). Species or community occurred historically in the nation or state/province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years.*
- *S#S# A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community.*
- *S#? Rank uncertain.*

[2] ***ESA Status:*** *The Endangered Species Act 2007 (ESA) protects species listed as Threatened and Endangered on the Species at Risk in Ontario (SARO) List on provincial and private land. The Minister lists species on the SARO list based on recommendations from the Committee on the Status of Species at Risk in Ontario (COSSARO), which evaluates the conservation status of species occurring in Ontario. The following are the categories of at risk:*

END *(Endangered)*	*A species facing imminent extinction or extirpation in Ontario.*
THR *(Threatened)*	*Any native species that, on the basis of the best available scientific evidence, is at risk of becoming endangered throughout all or a significant portion of its Ontario range if the limiting factors are not reversed.*
SC *(Special Concern)*	*A species that may become threatened or endangered due to a combination of biological characteristics and identified threats.*
NAR *(Not at Risk)*	*A species that has been evaluated and found to be not at risk.*

[3] ***COSEWIC Status:*** *Committee on the Status of Endangered Wildlife in Canada (COSEWIC) evaluates a federal status ranking for all species that it assesses. Rankings include the following:*

END *(Endangered)*	*A species facing imminent extirpation or extinction throughout its range.*
THR *(Threatened)*	*A species likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction*
SC *(Special Concern)*	*A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events, but does not include an extirpated, endangered or threatened species.*
NAR *(Not at Risk)*	*A species that has been evaluated and found to be not at risk.*

[4] ***SARA Status***: *The Species at Risk Act (SARA) protects Species at Risk designated as Endangered, Threatened and Extirpated listed under Schedule 1, including their habitats on federal land. Schedule 1 of SARA is the official list of wildlife species at risk in Canada and includes species listed as Extirpated, Endangered, Threatened and of Special Concern. Once a species is listed on Schedule 1, they receive protection and recovery measures that are required to be developed and implemented under SARA. Species that were designated at risk by COSEWIC before SARA need to be reassessed based on the new criteria of the Act before they can be listed under Schedule 1. These species that are waiting to be listed under Schedule 1 do not receive official protection under SARA. Once the species on other schedules (2 and 3) have been reassessed, the other schedules are eliminated and the species is either listed under Schedule 1 or is not listed under the Act.*

The following are definitions of the SARA status rankings assigned to each species.

END (Schedule 1)	These species are listed as Endangered under Schedule 1 of SARA and receive species and habitat protection under SARA, as well as recovery strategies and action plans.
THR (Schedule 1)	These species are listed as Threatened under Schedule 1 of SARA and receive species and habitat protection under SARA, as well as recovery strategies and action plans.
SC (Schedule 1)	*These species are listed as Special Concern under Schedule 1 of SARA and receive management initiatives under SARA to prevent them from becoming endangered and threatened.*
No Status (No schedule)	*These species are evaluated and designated by COSEWIC but are not listed under Schedule 1 and therefore do not receive protection under SARA.*
NAR (Not at Risk)	*These species have either been assessed by COSEWIC as Not at Risk or there is not enough sufficient data to assess the status ranking of the species and therefore these are not listed on Schedule 1 nor do they receive protection under SARA.*
Not Applicable (N/A)	*These species have either been assessed by COSEWIC as Not at Risk or there is not enough sufficient data to assess the status ranking of the species and therefore these are not listed on Schedule 1 nor do they receive protection under SARA.*

Source: Government of Canada, 2009: Frequently Asked Questions: What are the SARA schedules? Accessed on February 2015. Available: http://www.dfo-mpo.gc.ca/species-especes/faq/faq-eng.htm

[5] *Eastern Musk Turtle has been recently down listed from Threatened to Special Concern by COSEWIC but this change has not yet been updated under Schedule 1 of SARA. Therefore this species designation as Threatened under Schedule 1 of SARA may change in the future.*

4.2 Socio-Economic Environment

Existing socio-economic conditions were gathered through desktop research using secondary sources such as existing GIS data, as well as from community, municipal and government websites. Sources used include the HIFN website, published statistics from Statistics Canada and Aboriginal Affairs and Northern Development Canada (AANDC), treaty and land claims information from the Aboriginal Treaty Information Research System (ATRIS), and previously asserted interests on other projects such as the Highway 69 expansion. Aboriginal traditional knowledge pertaining to HIFN Reserve lands was also considered as part of the research. Existing socio-economic features provide a baseline from which HIWEC related effects can be assessed.

The socio-economic environment consists of features deemed important to the day-to-day function of the community and that bolster community well-being and cohesion. These include aspects such as community population and economic conditions, as well as the structures and institutions that are integral to community function. Other aspects such as land use and areas important for cultural heritage or archaeological importance are also included as they relate to the community's character.

For the purposes of the socio-economic existing conditions study, the HIWEC regional study area was reviewed, which includes the adjacent Municipality of Killarney and geographic municipalities of Henvey Township and Mowat Township, where applicable. Henvey Township and Mowat Township are two (2) unincorporated townships that are part of the Parry Sound District which do not have local level governance or any local service boards that provide typical municipal services. The socio-economic features identified through background review are described throughout subsequent sections and are shown in **Figure 4-8**.

4.2.1 Henvey Inlet First Nation Overview

HIFN is an Anishinabek community located between Parry Sound and Sudbury, with the main village located 1 km from Highway 69 near Grundy Lake Provincial Park. The community has both on- and off-Reserve members and includes two (2) Reserves, French River Reserve No. 13 which includes Cantin Island, while the other Reserve is HIFIN I.R. #2, the proposed site of the HIWEC. **Figure 2-1** illustrates the location of the HIFN Reserves. The location and characteristics of the Reserves are examined in subsequent sections.

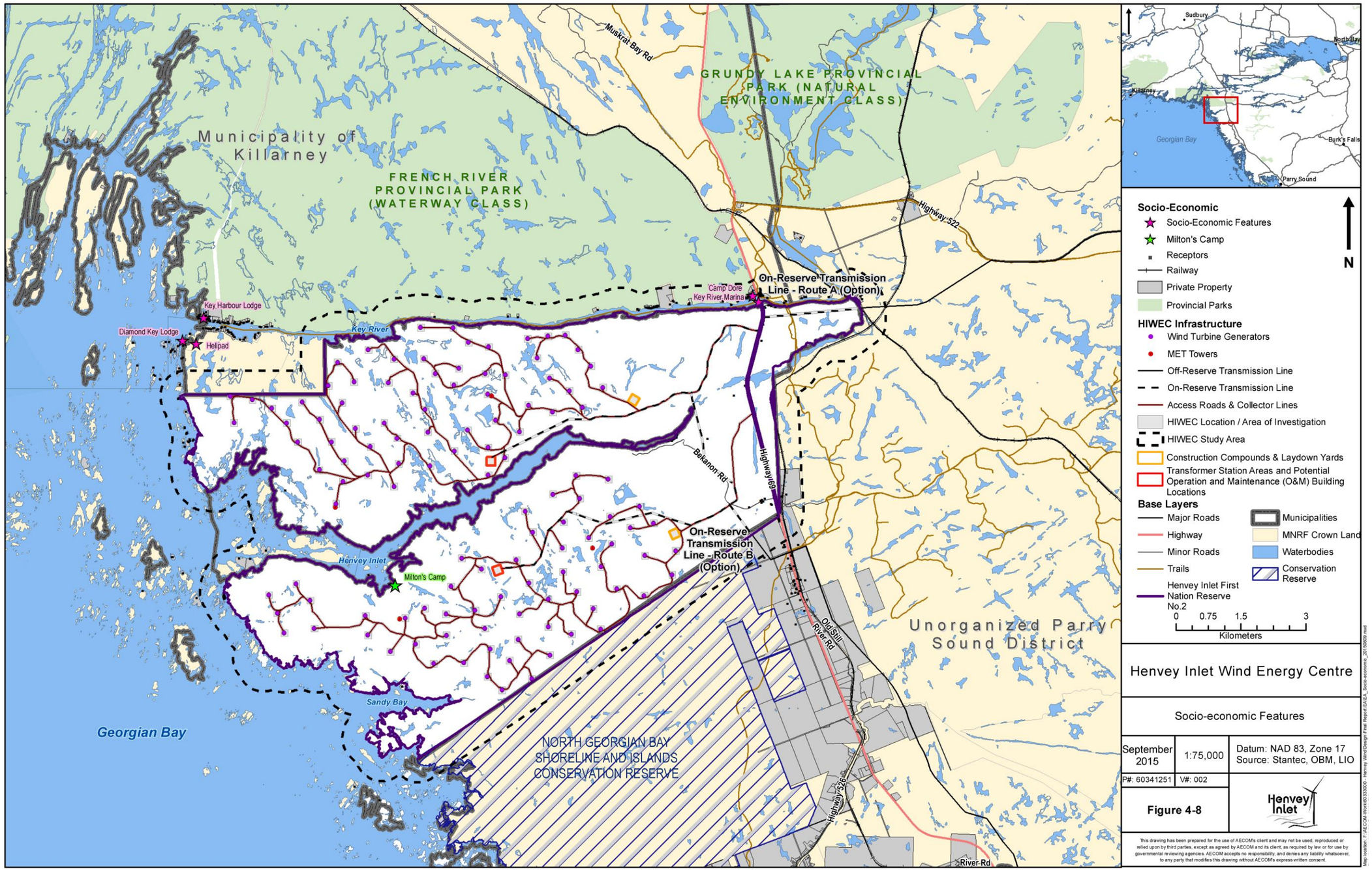
4.2.1.1 Pre-Contact History

The history of HIFN is tied to its geographic location at Henvey Inlet, and its proximity to the French and Pickerel Rivers. The rivers have been used by HIFN members for fishing, hunting, trade, and logging (HIFN, 2015a).

Although often referred to by settlers as "Ojibway", today many in the community prefer to be referred to as Anishinabek, a term meaning "First People." The Anishinabek people inhabited the region in which Henvey Inlet is situated prior to European arrival. When the Anishinabek people first encountered European explorers and fur traders, there were many similar, but politically autonomous groups in what is now Ontario. Many of the Bands or Tribes were given different names despite sharing many common linguistic and cultural similarities. Some examples of these names are: Algonquin, Ojibway, Odawa, Chippewa and Mississauga.

Today, the concept of an Anishinabek Nation now links speakers of the Ojibway language. The Odawa (or Ottawa), occupied much of the north shore of Gregorian Bay and Manitoulin Island and Bruce Peninsula, where they bordered with the Huron and Petun (McMillan and Yellowhorn, 2004). Their role as intermediaries in the trade with these Iroquoian groups gave rise to calling them 'traders'. The Algonquian inhabited the Ottawa Valley and adjacent regions in the early contact period. They are all collectively referred to as Anishinabek because linguists determined they all speak the same language in different dialects (McMillan and Yellowhorn, 2004; Schmalz, 1991). HIFN and many of its neighbouring First Nations consider themselves Anishinabek people.

Figure 4-8: Socio-economic Features



4.2.1.2 Contact-Period History

The HIWEC study area was first explored by Europeans in the early 1600s, who travelled the French River into Georgian Bay from the Ottawa River. This led to the development of fur trade posts in the area. During the period between 1670 and 1713, French traders began to leave established settlements and construct trading posts that enabled traders to make direct contact with the people living in the interior. The Nipissings, Odawa and other Anishinabek groups in Northern Canada were referred to as the 'middlemen' of the trade all the way north to James Bay (Hunt 1940: 35, 45; Pollock 1999). An examination of the Atlas of Canada's map "Posts of the Canadian Fur Trade, 1600-1870" indicates the presence of three (3) Fur Trade Posts in close proximity to HIFN I.R. #2. The Hudson's Bay Co. had a post at the mouth of the French River, and one (1) south of the HIWEC study area called Shawinaga, near Pointe au Baril. There were also multiple Independent Canadian posts in the surrounding area, but a large number of them were located around Lake Nipissing to the northeast. The map is included in the Stage 1 Archaeological Assessment in **Appendix K1**.

Competition for resources between French and English led to alliances, such as the French-Huron alliance which began in 1615. The northern coasts of Georgian Bay and Lake Huron may have served as a transition zone or buffer between the Anishinabek and Iroquois, as it was sparsely occupied until the return of the Ojibway (Anishinabek) along the Georgian Bay and Lake Huron in the 1700s (Pollock, 1999). By the early 1800s, securing mining and other resources became increasingly important, and a driving force for Upper Canada to begin looking to northern territories. The treaty making process for the Robinson Huron Treaty of 1850 was established during this period which established Reserves of land for many Anishinabek communities. Two (2) of the Reserves under this treaty would become HIFN Reserves (HIFN I.R. #2 and French River Reserve No. 13). These Reserves are explained in **Section 4.2.1.3.1**.

Initial surveys in the area consisted of efforts confined to canoe through rivers and water ways. The area remained relatively untouched by European development until the Muskoka and Parry Sound Districts were surveyed between 1866 and 1870 (Campbell, 1992). Despite the surveyors reporting that the land was unfit for farming, the wealth in timber was deemed highly profitable. Communities on Georgian Bay, i.e., Killarney, Byng Inlet / Britt, Parry Sound, developed not as service centres for surrounding farmland, which was the case in Southern Ontario, but as isolated ports, railway stops, or company mill towns (Campbell, 1992).

The Northern and Pacific Junction Railway became part of the Grand Trunk railroad system which opened up Parry Sound and Muskoka's isolation. The railway was constructed in the 1880s to connect the railways of Southern Ontario to the new transcontinental line of the Canadian Pacific Railway. Communities like Britt and Key Harbour survived as railway ports to unload coal and oil off tankers that were coming from Lake Superior and Lake Huron (Campbell, 1992). Key Harbour's location near HIFN I.R. #2 may have made the area surrounding the harbour important for local transportation and timber extraction. Some historic port infrastructure remains in the form of pier pilings at Key Harbour and a coal storage structure adjacent to the old pier.

The area near French River Reserve No. 13 experienced more growth compared to HIFN I.R #2 during this period due to its location near the French River. This river was part of a key water transportation route from the St. Lawrence River to the Great Lakes via the French River and Ottawa River systems from 1600 to the mid-1800s. The area prospered within the fur trade, as well as commercial logging and fishing. The French River Village was originally developed in the late 1880s as a result of the extensive logging industry. Timber cutting, logging and lumber mills sprang up in the area in 1873 until the 1930 depression era. Population declined steadily during the depression years, but the area was never totally abandoned. Today it continues to support a small population and enjoys a summer boom. A few original structures still remain from the period, along with extensive foundations from the mill (HIFN, n.d.). In the early 1960s, the Ontario Government closed the area for further development making it part of the North Georgian Bay Recreation Reserve. The French River was designated Canada's first Heritage River in 1986.

4.2.1.3 Treaties and Reserves

4.2.1.3.1 Robinson Huron Treaty (1850)

The first treaty signed within this region was the Robinson Huron Treaty, a treaty signed between Crown representatives and the communities living along northern Georgian Bay and the North Shore of Lake Huron. The 1850 Robinson Huron Treaty was different from others negotiated in the southern portion of the Province in that the Crown promised the creation of Reserves, annuities, and the continued right to hunt and fish on unoccupied lands. The boundaries of the treaty extended from the lake shore between the Sault Ste. Marie area and the southern end of Georgian Bay to the height of land, an ill-defined area inland that extended to the limits of the lake's watershed (AANDC, 2013).

HIFN is a signatory of the Robinson Huron Treaty. The community derives from two (2) Bands that sent representatives to the Robinson Huron treaty signing, namely Chief Louis Mishequanga's Band at French River Reserve No. 13 and Chief Wagamake's Band at the mouth of Henvey Inlet on Georgian Bay (HIFN I.R. #2), both of which amalgamated in 1923 to become HIFN.

The HIWEC study area has been inhabited since at least 1851, when the first surveyor mapped HIFN I.R. #2 following the signing of the Robinson Huron treaty. The surveyor met Chief Wagamake "at their village for the purposes of pointing out the limits of their Reserve" (Dennis 1851: diary and field notes, vol. 1). The Band had chosen to reserve this location because of the valuable fisheries, the location of a village on the south shore of the Inlet, as well as a cornfield, and a sugar bush on the portage between the Key River and Henvey Inlet (Pollock, 1999). A 2010 report on the village identified its name as "Nekickshegeshing," or "Day of the Place of the Otter," Elders in the community believe the name was likely in reference to the Otter clan within HIFN, as well as the village's role as a favourite stopping place on the traditional long distance canoe route between southern Georgian Bay and Lake Nipissing (Allen, 2010).

In 1852 the lands were agreed upon by Chief Wagamake, Dennis and J. William Keating, a former Assistant Indian Superintendent. Dennis also surveyed the Lower French River Reserve, now known as French River Reserve No. 13, in May of 1853.

HIFN traditional knowledge recounts the presence of another later village on the Key River that existed in the late 1800s. A smaller number of Band Members lived on the Reserve near Bekanon Road. Many members of the Key River settlement moved to the French River Reserve No. 13 between the 1940s and 1950s while the current village site was developed.

The two (2) Reserves provided to HIFN are shown in **Figure 2-1** and are described as follows:

- HIFN I.R. #2 is located on the North East shore of Georgian Bay, approximately 90 km south of Sudbury on the west side of Highway 69 and 71 km north of Parry Sound, at approximately 40 degrees 50' North latitude and 80 degrees 40' west longitude. The Reserve size is approximately 9,233 ha.
- French River Reserve No. 13, which is located 11 km north of the HIFIN I.R. #2, is east of Highway 69 on Pickerel River, and approximately 45 degrees 58' North latitude and 80 degrees 30' West longitude. French River Reserve No. 13 is the location for the community's main village. This village is located on Pickerel River Road. The community notes that Cantin Island is part of this Reserve, and the island is located north of the mainland portion and separated by the Pickerel River and the French River on the north side. The Reserve size is 2,544.60 ha (AANDC, 2015a).

4.2.1.3.2 Land Claims

HIFN has two (2) specific claims (those pertaining to specific asserted infringements):

Claim	Status	Potential Relevance
James Bay Railway Alleged illegal appropriation of land from the HIFN I.R. #2.	In Negotiations. Claimant agreed to negotiate January 17, 2012.	Yes. This claim refers to HIFN I.R. #2, the location of the HIWEC, although all rail lines in the vicinity are to the east of the HIWEC.
Treaty Rights Chiefs of the Robinson Huron Treaty area asked that their treaty dated 1850 be renegotiated alleging that the Crown failed to meet certain commitments under the treaty specifically: Crown liability regarding First Nation land, hunt / fish rights.	Concluded.	No. This claim is concluded.

Source: AANDC, 2015b.

HIFN has the following comprehensive claim (claims pertaining to broader themes such as representation):

Claim	Status	Potential Relevance
Self-Government Negotiations Anishinabek Nation (Union of Ontario Indians)	Accepted for negotiations. Negotiations to finalize a treaty.	Potential. This is a general claim that may have some relevance for the management of Crown lands in this region, although no agreement has been reached.

Source: AANDC, 2015b.

4.2.2 Other Aboriginal Interests

The HIWEC is proposed entirely on HIFN I.R. #2 and, as such, no other Aboriginal interests are anticipated. Off-Reserve areas may be subject to other Aboriginal interests based on their traditional territories and potential impacts to other Aboriginal interests are discussed in **Volume B**.

4.2.2.1 Métis Interests

The Métis are an Aboriginal people as enshrined by the Canadian *Constitution Act*, *1982* and as such have Aboriginal rights. Métis interests are best confirmed through engagement with the Métis Nation of Ontario (MNO) Lands and Consultation Unit. The formal process for Métis consultation requires that the MNO Lands and Consultation Unit be the first contact for engaging with individual Métis community councils in Ontario.

The closest Métis community councils are located in Sudbury, North Bay and Mattawa:

- MNO Sudbury Métis Council – www.sudburymetiscouncil.org
- MNO North Bay Métis Council – www.northbaymetiscouncil.ca
- MNO Mattawa Métis Council – no website is available

The Métis are the descendants of mixed European and Aboriginal ancestry that, over time, developed into a unique culture within Canada. Métis culture has many ties to the early fur trading practiced by French (as well as some English and Scottish) traders which were some of the first visitors to the interior of North America.

French fur traders are known to have used the French River and related watershed to transport furs and explore the area between the Ottawa River and Georgian Bay. The proximity of this trade route may suggest that Métis Councils could have Aboriginal interests pertaining to areas within the region surrounding the HIWEC.

The MNO has a harvesting agreement with the MNRF, outlined in a 2004 MNO-MNRF Harvesting Agreement. The MNO 2011 Harvesting Policy based on this agreement allows for Métis citizens to harvest for personal use items on Crown land such as plants, fish, wildlife and firewood gathered for heating, food, medicinal, social or ceremonial purposes (MNO, 2011). The MNO identifies that the Georgian Bay coastal areas are part of the Georgian Bay Traditional Harvesting Territory (MNO, 2015).

4.2.2.2 Williams Treaties (1923)

The HIWEC study area also falls within the limits of the Williams Treaty signed in 1923, although HIFN is not a signatory. The Williams Treaties (1923) sought to rectify a situation where Chippewa and Mississauga communities to the south were not included in the Robinson Huron Treaty process, and to create a treaty for areas south of the French River pertaining to these communities. Signatories of the treaty include the Chippewas of Lake Simcoe, Lake Huron and the Mississaugas of Rice Lake, Scugog, Curve Lake and Alderville in central Ontario. These communities are now the following:

- Alderville First Nation;
- Curve Lake First Nation;
- Hiawatha First Nation (Mississaugas of Rice Lake);
- Mississaugas of Scugog Island First Nation;
- Chippewas of Rama First Nation;
- Chippewas of Georgina Island First Nation; and
- Beausoleil First Nation.

The Robinson Huron Treaty and Williams Treaties appear to overlap. The map in **Figure 4-9** identifies the Williams Treaties area as well as the Robinson Huron Treaty area. Note that some signatories such as HIFN are signatories of the Robinson Huron Treaty shown as a green diamond symbol in **Figure 4-9**. MOECC confirmed that engagement with select signatories of the Williams Treaties may be required if the activities are to occur south of the Seguin River, the northern extent of their traditional territory. No HIWEC activities will take place south of Parry Sound.

Figure 4-9: Pre-1975 Treaties in Ontario

Source: AANDC, 2014.

4.2.3 Land and Resources Used for Traditional Purposes by Aboriginal Persons

4.2.3.1 Traditional Land Use

HIFN includes a creation story on its website, as told by Darlene Johnson, an Anishinabkwe (alternate spelling) professor for the University of Toronto. The story identifies how the earth came to be, as well as the importance of animals such as the hare, beaver, otter, muskrat and fox as part of the Anishinabek world view (HIFN, 2015b).

Anishinabek subsistence was based on the annual round of hunting, fishing and plant collecting. The winter was devoted to the pursuit of moose, deer, bear and other large game. In spring, families would return from their hunting camps to rejoin others at their major fishing sites. Pickerel, pike and suckers could be caught throughout the summer, and autumn spawning brought whitefish, trout and sturgeon close to shore. The Anishinabek netted or speared large quantities of fish, and the fisheries became centres of community life and cultural interaction. From writings of the Jesuits, it was documented during the mid-17th century that up to 2,000 individuals might converge at the rapids of Sault Ste. Marie (McMillan and Yellowhorn, 2004). Plant foods have always played an important role in Anishinabek economy; maples were tapped, berries collected, and wild rice harvested from the shallow waters of nearby lakes. In order to transport food stuffs and travel between different resource areas Anishinabek people utilized birch bark canoes. These canoes were tough, but lightweight, which allowed for easy portage between waterways (McMillan and Yellowhorn, 2004).

Living quarters consisted of dome-shaped structures, referred to by the Algonquin term, wigwams. Sheets of birchbark covered the structure, layered in a way to allow for moss in between acting as insulation. Conical or tipi-shaped structures were also not uncommon (McMillan and Yellowhorn, 2004; Schmalz, 1991). Hides were utilized for clothing, stitched together using sinew. Social interaction was essential to the survival of the peoples, in which activities included feasting, dancing, lacrosse and gambling with bone dice. Storytelling was at the heart of many social gatherings. Rich oral traditions consisted of Anishinabek mythology designed to both entertain and instruct, filled with powerful supernatural humans and animals (McMillan and Yellowhorn, 2004). Every animal, bird, plant, or inanimate object had a power that could either help or hinder humans. The Anishinabek were widely respected for their shamanic abilities to cure illness, see spirits at work, and provide blessings for numerous activities.

The 2011 Preliminary Environmental Constraints Analysis identified the presence of areas within HIFN I.R. #2 for harvesting species such as moose, beaver, muskrat and waterfowl near the HIFN WTGs. None of the fur-bearing or game species important to hunters and trappers are rare or protected. HIWEC components were sited to avoid wetlands that are important for waterfowl, amphibians and reptiles that may be used for other traditional harvesting practices. The presence of fish habitat within HIFN I.R. #2 within watercourses, lakes and open water is also suggestive of the potential for traditional harvesting of fish by Aboriginal individuals (Neegan Burnside, 2011).

The 2011 Constraints Analysis identified that vegetation on HIFN I.R. #2 is generally sparse, although extensive timber harvesting occurred in the past and forested areas have been largely over-exploited and unsuitable for commercial or industrial harvesting operations (Neegan Burnside, 2011).

HIFN prepared the *Traditional Land Use Study Related to Proposed Four Lane Highway 69* in 2013. Community members and groups were interviewed to provide information on historic and current land uses within the community's traditional territory.

Due to the confidential nature of sensitive community information, a general summary is provided without identifying specific locations.

- **Food Sources:** The community traditional land use study covered topics including hunting, fishing, trapping, gathering as well as cultural practices, all of which occur within its traditional territory.
  - The community historically consumed much more fish than large game as fishing was far easier than hunting larger game.
  - Gathering for food included various species of naturally occurring berries.
  - Squash and corn were planted as a food source.
- **Animal behaviours:** Members identified locations on-Reserve that are particularly important for their traditional way of life, including fish spawning areas and deer crossing locations.
- **Gathering (Ceremonial):** Items gathered for their cultural and spiritual value includes types of bark and plants added to teas or as part of smudging ceremonies. Sweet grass is of particular importance to the community.
- **Travel routes**: These routes typically corresponded with access provided by rivers. These travel routes were identified as having economic, historical and cultural significance. Some built trails such as railway right of ways or other existing trails were also important to the community.
- **Landmarks:** The traditional land use study also mapped built infrastructure or features on the land such as former hotels or camps, beach sites, or local landmarks that are important for the community's sense of place.
- **Species at Risk:** The community has raised concerns about SAR, including the Blanding's Turtle.
- **Water:** Surface water and groundwater are important to the community. Water has important linkages to travel, drinking water and cultural uses (HIFN, 2013).

The *Traditional Land Use Study Related to Proposed Four Lane Highway 69* provided to the assessment team is used internally, and in discussion with HIFN Chief and Council and the community, to avoid and / or mitigate potential impacts to sites where necessary. These areas are considered as part of the EA, along with consultation with elders and other community members.

4.2.3.2 Nishshing Aki

Nishshing Aki is defined as an existing social or cultural feature or condition that has been identified as valued by HIFN or designated as valued by HIFN with community input as provided in the Land Code. These features include sacred sites, burial grounds and old settlements. A general summary of Nishshing Aki identified through the *Traditional Land Use Study Related to Proposed Four Lane Highway 69* is provided below.

- **Settlements:** The site of a historic village for the community was identified within Reserve lands, as well as former cabin and camp locations. These locations are typically associated with rivers and waterbodies that cross the community's traditional territory. Inland areas were not used for settlements, but rather were for hunting, trapping, gathering traditional medicines, and making syrup.
- **Sacred locations:** These refer to areas such as grave sites. The locations of these areas are particularly sensitive for community members. Many of these locations are not to be shared with individuals outside of the community.
  - The study identified burial locations, ceremonial locations (such as sweat lodges), and other sacred areas which will be avoided by development.

4.2.3.3 Anishinabek Current Land Use: On-Reserve

In 2006, HIFN became a signatory of the *FNLMA*, and entered into a separate agreement in 2009 with the Minister of Indian Affairs and Northern Development (now AANDC). The community now has the authority to enact laws respecting environmental assessment and environmental protection on-Reserve. The community has enacted an environmental law covering the EA process under which the HIWEC will be reviewed.

HIFN's Land Code governs current land usage within the community, including the lands proposed to be used for the HIWEC. Lands selected for use for the HIWEC are based on knowledge gathered within the community, supported by environmental and technical siting studies to minimize effects on the land and can feasibly be constructed.

As part of the Robinson Huron Treaty, community members have maintained their Aboriginal rights to hunt, fish and continue their traditional land uses, both on-Reserve as well as off-Reserve. These traditional land uses continue to the present day, and the Land Code seeks to protect ongoing opportunities to perform these functions.

The Union of Ontario Indians (the Anishinabek Nation) has a Trapping Harmonization agreement with the federal and provincial government in which it allows the organization to manage Aboriginal trapping activities on-Reserve (Anishinabek Nation, 2015).

4.2.3.4 Regional Anishinabek Natural Environment Interests

An analysis of regional projects provides additional insight into the interests of HIFN and regional First Nations regarding land use.

HIFN has been involved in negotiations with the MTO with respect to the widening of the Highway 69 corridor, which is intended to provide a four (4) lane divided highway linking Sudbury and cities to the south including Parry Sound. These negotiations are ongoing.

Six (6) communities, including HIFN were involved in the development of the French-Severn Forest Management Plan for the area between Georgian Bay and Algonquin Park (MNRF, 2009). The French-Severn Forest Management Plan was developed and is maintained by a non-profit organization, Westwind Forest Stewardship, who is the Sustainable Forest License holder (MNRF / Westwind Forestry Management, 2009). The plan summarized the interests of First Nations in the area as tending towards Crown land when using land off-Reserve for hunting, fishing, gathering and spiritual / cultural practices. Some communities are interested in fisheries management and watersheds, renewable energy opportunities, economic development opportunities, interest in shared stewardship opportunities across the land base, and preserving Aboriginal cultural values.

The French-Severn Forest Management Plan also identified Aboriginal interests in the following areas:

- **Compensation:** Issue most commonly articulated by Robinson-Huron Treaty signatory communities who feel strongly that Resource Benefit Agreements or revenue sharing (i.e., Crown dues) is a fundamental part of their treaty rights.
- **Forest Harvesting:** Many First Nations continue to express interest in easy access to timber harvests within close proximity to their communities for personal / communal use or commercial profit. There is growing interest in some communities in supporting emergent bio-energy opportunities through post-harvest processing (i.e., chipping).
- **Forest Spraying:** Early and on-going communication throughout the Forest Management Plan's life cycle is very important to many communities. With respect to spray programs, First Nations may have site specific values / interests which need to be considered, or conversely may wish to participate in on-Reserve treatments at the same time as the nearby Crown forest.
- **Access:** With continued and growing pressures on access to resources by various third party interests, First Nations continue to be concerned that both physical access to Crown land and access to the resources themselves are threatened. In the case of Robinson Huron Treaty signatories, this is acutely expressed as a potential threat to their treaty rights.
- **Values Protection:** Perhaps the issue of greatest interest and discussion, but the most challenging as well, is the protection of community values. The protection of Aboriginal values throughout the planning cycle is of key importance to First Nations, MNRF, Westwind Forest Stewardship and their partners, and the Planning Team as a whole. Continuing to foster and build strong, trusting relationships between all parties is key in protecting Aboriginal values across the forest (Ministry of Natural Resources and Westwind Forest Stewardship Inc. Forest Management Plan for the French / Severn Forest (360), Period April 1, 2009-March 31, 2019).

As discussed previously, HIFN is also a member of the Union of Ontario Indians (the Anishinabek Nation), a 39-member First Nations political organization that advocates for member interests including lands and resources access. The group asserts aboriginal interests in water quality, trapping through an existing Trapping Harmonization Agreement with federal and provincial entities, aboriginal participation in the forestry and mining sectors, as well as ongoing negotiations regarding resource benefit sharing. Many of these interests are expected to be shared by HIFN given its membership in the organization (Anishinabek Nation, 2015).

4.2.3.5 Economic Geology

High quality aggregate deposits are not common within the Parry Sound region and existing pits most commonly exploit glaciolacustrine deposits, which are too small in size to be a significant economic resource. Quarrying of bedrock resources for road building materials also occurs throughout the area. The location of nearby pits and quarries, regulated under the *Aggregate Resources Act*, has been included on **Figure 4-2**.

4.2.4 Socio-Economic Features: On and Off-Reserve

The HIWEC study area is located on-Reserve, however, there are a number of other socio-economic features within the immediate vicinity that provide services or have an influence on HIFN's existing conditions. **Table 4-10** identifies various socio-economic features identified through desktop research.

Table 4-10: Key Socio-Economic Features Near the HIWEC Study Area

Name of Feature	Approximate Location	Type of Feature *(School, Hospital, etc.)*	Details
Forest Access Road	Intersects Highway 69 just South of HIFN I.R. #2	Access road	Recreation access route, former logging route.
Railway Corridor	Parallel to Highway 69 through HIWEC study area	Rail corridor	Two (2) railway lines owned by Canadian Pacific Railway and Canadian National Railway respectively, used for freight purposes, intersect near the eastern extent of HIFN I.R. #2. The Canadian Pacific Railway line passes through the main community village on French River Reserve No.13.
Grundy Lake Provincial Park	Intersection of Highway 69 and Highway 522	Provincial Park	Located immediately south of French River Reserve No. 13. Source of visitors to the area.
French River Provincial Park	Located across from HIFN I.R. #2, at Key River	Provincial Park	Located immediately north of the HIFN I.R. #2. The park is a large waterway class park.
Key River Marina	Adjacent to Highway 69 north of HIFN I.R. #2 and the Key River	Overnight accommodation, marina, recreation	Lodging, canoe rentals and sales, boat storage and repair, boat launch.
Esso Station	Highway 69 north of HIFN I.R. #2 and Key River	Fuel and convenience store	Gas bar with convenience store.
Unnamed restaurant	Highway 69 north of HIFN I.R. #2 and Key River	Restaurant	Attached to convenience store associated with the Esso station.
Camp Dore	Highway 69 north of HIFN I.R. #2 and Key River	Overnight accommodation, marina, store, marine taxi	Boat launching, parking, dock slip rentals, indoor and outdoor winter boat storage, boat rentals, fishing store, marine Taxi service, six (6) log cabins for rent, fuel for sale.
Key Harbour Lodge	West of Highway 69 on the north side of the Key River where it meets Georgian Bay	Overnight accommodation, recreation	Dock slip, water sports, hunting and fishing, lodging, general store.
Diamond Key Lodge	West of Highway 69 on the south side of the Key River where it meets Georgian Bay	Overnight accommodation, recreation	Lodging, fishing, hiking, water sports.

There are additional socio-economic features related to cottage / residential areas along the Key River, situated along the northern boundary of the HIWEC study area. The area is popular for cottage-goers and water sports enthusiasts and also has a stopping point on Highway 69 which includes a gas station and marina located near the river crossing.

The Key River Area Association identifies approximately 100 seasonal and permanent residents in northeastern Georgian Bay. The intention of the group is to promote the interests of their members to government and other stakeholders and to maintain the peaceful nature of the community (Key River Area Association, 2015).

In the broader area, residential buildings are located in isolated areas along Highway 69 near the HIWEC study area.

4.2.5 Population and Economic Profile

4.2.5.1 Population

HIFN has members that live on-Reserve and off-Reserve. The population statistics provided by the community as shown in **Table 4-11** identify that most of HIFN's 600 community members currently live off-Reserve, with 150 residing within the community's Reserve lands.

Table 4-11: Henvey Inlet First Nation Population Statistics

Population Location	Number
On-Reserve	150
Off-Reserve	450
Total	**600**

Source: HIFN, 2015d

AANDC identifies an on-Reserve population that is slightly higher at 165 in 2011 and 115 members in 2006 (AANDC, 2015b). Statistics Canada Census 2011 provides data specifically about HIFN I.R. #2 where the HIWEC will be located. The population given for HIFN I.R. #2 was 15 in 2006 and 28 in 2011 (Statistics Canada, 2011).

4.2.5.2 Employment and Labour Force Indicators

Table 4-12 shows the Labour Force Indicators for HIFN. Between 2006 and 2011 the participation rate and employment rate rose in relation to an improving unemployment rate of 18.8%. This rate, however, is higher than the Canadian National average in 2011, reported by Statistics Canada at 7.8%.

Table 4-12: Henvey Inlet First Nation Labour Force Indicators

Labour Force Indicators	2011			2006		
	Total	***Male***	***Female***	***Total***	***Male***	***Female***
Participation Rate	66.7	69.2	63.6	52.9	75.0	44.4
Employment Rate	50.0	53.8	54.5	41.2	50.0	22.2
Unemployment Rate	18.8	33.3	28.6	22.2	33.3	0.0

Source: AANDC, 2015e

4.2.5.3 Occupations and Industries

Table 4-13 shows the Industry Characteristics for HIFN. Most individuals identified that their industry is "other services", while individuals also reported work within industries such as "Manufacturing and Construction," "Wholesale, Retail," and "Health and Education." Two (2) categories ("Business Services" and "Transportation, Warehousing") were reported in 2006 but not in 2011, which may be related to a similar higher reporting of "Other Services" in 2011.

Table 4-13: Henvey Inlet First Nation Industry Characteristics

Industry Indicators	2011			2006		
	Total	*Male*	*Female*	*Total*	*Male*	*Female*
Population 15 years and over	120	65	55	85	45	40
Agriculture, resource based	0	0	0	0	0	0
Manufacturing, construction	10	10	0	10	10	0
Wholesale, retail	10	0	0	10	0	0
Finance, real estate	0	0	0	0	0	0
Health, education	10	0	10	10	0	10
Business services	0	0	0	10	0	0
Transportation, warehousing	0	0	0	0	10	0
Other services	40	20	20	25	10	10

Source: AANDC, 2015e

Note: In some cases there is missing information, incorrect totals and rounded data. According to AANDC and Statistics Canada, procedures are applied to prevent the possibility of associating statistical data with any identifiable individual: the data are randomly rounded and they are suppressed for certain geographic areas (AANDC, 2015e).

Table 4-14 shows the Occupation Characteristics for HIFN. The 2006 occupation data is limited and may not have been reported to AANDC. The most common occupation classifications are “social science / government”, “sales and service”, and “trades and related industries.”

Table 4-14: Henvey Inlet First Nation Occupation Characteristics

Occupation Characteristics	2011			2006		
	Total	*Male*	*Female*	*Total*	*Male*	*Female*
Population 15 years and over	120	65	55	85	45	40
Management	10	0	10	N/A	N/A	N/A
Natural Sciences, Health	10	0	0	N/A	N/A	N/A
Social Sciences, Government	15	0	15	N/A	N/A	N/A
Sales and Service	15	10	10	N/A	N/A	N/A
Trades and Related Occupations	15	15	0	N/A	N/A	N/A
Primary Industry	0	0	0	N/A	N/A	N/A
Other Occupations	0	0	0	N/A	N/A	N/A

Source: AANDC, 2015e

Note: In some cases there is missing information, incorrect totals and rounded data. According to AANDC and Statistics Canada, procedures are applied to prevent the possibility of associating statistical data with any identifiable individual: the data are randomly rounded and they are suppressed for certain geographic areas (AANDC, 2015e).

4.2.5.4 Business Activity

There is no commercial activity taking place at HIFN I.R. #2. The community has a commercial building at French River Reserve No. 13, as well as a gas station located 1 km from Highway 69 on Pickerel River Road. The gas bar also sells convenience store items as well as cigarettes.

Key River, located near the eastern extent of HIFN I.R. #2, has marina and gas station services available.

4.2.6 Government Structure and Services

4.2.6.1 Governance On-Reserve

The current Chief and Council of HIFN are listed below.

- Chief Wayne McQuabbie;
- Councillor Brenda Contin;
- Councillor Lionel Fox;
- Councillor Carl Ashawasagai;
- Councillor Patrick Brennan;
- Councillor Tony Solomon; and
- Councillor Genevieve Solomon-Dubois (HIFN, 2015c).

The community is part of the Waabnoong Bemjiwang Association of First Nations, an organization established to provide technical services to member communities, rather than political leadership. The members of this Tribal Council are located within a similar geographic area of Central Ontario and tribal council groupings often have similar cultural, heritage and linguistic characteristics. The Tribal Council members include:

- Henvey Inlet First Nation;
- Dokis First Nation;
- Magnetawan First Nation;
- Nipissing First Nation;
- Wahnapitae First Nation; and
- Wasauksing First Nation (AANDC, 2015a).

HIFN is also part of Union of Ontario Indians as discussed previously, as well as the Chiefs of Ontario, two (2) political organizations of Aboriginal chiefs.

4.2.6.2 Governance Off-Reserve

Municipalities adjacent to the HIFN I.R. #2 are the Municipality of Killarney, Henvey Township and Mowat Township. Henvey Township and Mowat Township are two (2) unincorporated townships that are part of the Parry Sound District which do not have local level governance or any local service boards that provide typical municipal services. Much of the land within the townships is Crown land, and is under the jurisdiction of provincial agencies such as MNRF or MTO.

The Municipality of Killarney is a single tier incorporated municipality with its own council and local level governance. The Municipal Council has six (6) members made up of a mayor, three (3) councillors from Ward 1 and two (2) councillors from Ward 2, which is adjacent to the northern boundary of the HIWEC study area (Municipality of Killarney, 2015a). Land use planning within the Municipality of Killarney is under the jurisdiction of the Sudbury East Planning Board and many municipal, social and emergency services are delivered by the Manitoulin-Sudbury District Services Board (DSB) (Municipality of Killarney, 2015b; Municipality of Killarney, 2015c).

4.2.6.3 Off-Reserve Social Services and Organizations

The Parry Sound District Social Services Administrative Board (PSDSSAB) oversees programs such as Children's Services such as day care licensing, social housing units, Ontario Works (financial and employment support for those in need), and a Women's Shelter in the Parry Sound District. Licenced childcare centres are located in:

- Parry Sound;
- South River;
- Emsdale; and
- Powassan.

Early Years Programs / Best Start Child and Family Centres are locations enabling parents and children to drop-in, meet, share, and play and find support and information for children's programing. The PSDSSAB identifies that

there are over 40 Early Years Programs / Best Start Child and Family Centres throughout the Districts of Parry Sound and Muskoka (PSDSSAB, 2015).

The PSDSSAB owns and operates 209 units in the District through the Parry Sound Housing Corporation. In addition to the PSDSSAB stock, there are 164 units of non-profit housing stock in the District (PSDSSAB, 2015).

The Manitoulin-Sudbury DSB oversees social and emergency services within the Manitoulin District and Sudbury District, including the Municipality of Killarney. The DSB is responsible for Ontario Works, Social Housing, Emergency Medical Services (Land Ambulance) and Early Learning and Child Care Services (Manitoulin-Sudbury DSB, 2015).

4.2.7 Infrastructure

4.2.7.1 Housing

The main HIFN village is on French River Reserve No. 13, along Pickerel River Road. At the present time there are 50 houses; most of which have been built within the last 10 to 15 years. More housing is in the planning stages along Pickerel River Road within French River Reserve No. 13 and further subdivision will occur if the population continues to increase. There is a small population at the HIFN I.R. #2 of approximately 12 households (HIFN, 2015a). Households are located along Bekanon Road and several cottages are located on the shores of Henvey Inlet.

4.2.7.2 Henvey Inlet First Nation Infrastructure and Services

HIFN has a fire hall and first responder service based on French River Reserve No. 13 which serves the local community village. There is a night landing heliport located on the French River Reserve No. 13 to assist with emergency evacuations. HIW will continue to consult with NAV CANADA and Transport Canada and meet all permitting and lighting scheme requirements to ensure that there are no impacts to the heliport.

The nearest hospitals are located in Parry Sound (89 km) and Sudbury (76 km). The First Nation offers a community medical van to provide access to local hospitals for non-emergency medical appointments (HIFN, 2015d.) A nursing station is available in Britt, and is part of the West Parry Sound Health Centre system. The station was established in 2012 and has a nurse practitioner on site (HIFN, 2015d; Northeast Health Line, 2015). The Manitoulin-Sudbury DSB has an ambulance and a volunteer fire department with a station near the First Nation in Noëlville which may provide support to the community for emergency calls (Manitoulin-Sudbury DSB, 2015; HIFN, 2015d).

The nearest Ontario Provincial Police station serving the community is located approximately 25 km away in Britt, Ontario.

The HIFN website identifies the following structures within its main village at French River Reserve No. 13:

- Public Works garage – 370 metres squared (m^2)
  - This structure includes Henvey Inlet Fire and Rescue and the First Response Team.
  - Community events are held in this location as well.
- Commercial building – 110 m^2. This building also includes the current Band Office.
- Former Band Office – leased by the Waabnoong Bemjiwang Association of First Nations Tribal Council.
- Subdivision development: Pickerel River Road – under development (HIFN, 2015a).
- No school on-Reserve. The community has a daycare and a library, which opened in 1999 and 2000, respectively. The library is notable as it offers public access to reading materials as well as public internet (HIFN, 2015a; HIFN, 2015d).

4.2.7.3 Henvey Inlet First Nation Utilities

4.2.7.3.1 Water

The HIFN village initially obtained water from two (2) pump houses for communal well service at French River Reserve No. 13, while outlying housing at HIFN I.R. #2 and Bekanon Road residents have private wells. A new water treatment facility is now operational at French River Reserve No. 13 serving the HIFN community (HIFN, 2015d).

4.2.7.3.2 Electricity

French River Reserve No. 13 and the homes along Bekanon Road have access to the Ontario electricity grid providing sufficient quantity to meet community needs. Electricity on HIFN I.R. #2 is available to the homes along Bekanon Road from the local distribution network operated by HONI.

4.2.7.3.3 Solid Waste

The on-Reserve landfill is non-operational. The community has hired a local contractor to bring waste to the Key River Landfill, a landfill operated by the Municipality of Killarney located off Highway 69 at Key River. The landfill accepts non-hazardous household and commercial waste (Municipality of Killarney, 2015d).

4.2.7.3.4 Communication Services

French River Reserve No. 13 has home mail delivery from Canada Post, access to telephone service from Bell Canada and high speed wireless internet. HIFN I.R. #2 is served by the Britt post office and does not have home delivery. The community has access to local radio and television service from regional centres such as Parry Sound, Sudbury, North Bay and Toronto (HIFN, 2015d).

4.2.7.4 Transportation

The Pickerel River Road provides access through the main HIFN village on French River Reserve No. 13 and a connection with Highway 69 – the main highway serving the Georgian Bay corridor from Parry Sound to Greater Sudbury. French River Reserve No. 13 is located immediately off Highway 69, just south of the Pickerel River.

HIFN I.R. #2 is accessible from Highway 69 and Highway 522, both of which are provincially maintained highways with Highway 69 being part of the Trans-Canada Highway. Within the HIWEC study area, Highway 69 is a paved, two (2) lane highway with passing lanes alternating between the Northbound and Southbound lanes. As of 2010, the annual average daily traffic volume for the section of Highway 69 from Highway 526 to Highway 522 is 6,900 (MTO, 2010). Through the Northern Highways Program 2013 - 2017, the Ontario Ministry of Northern Development and Mines (MNDM) and MTO have planned to widen the highway to four (4) lanes, with construction occurring in segments along the route between Sudbury and Parry Sound (MNDM, 2013).

Additional modes of transportation serving the HIWEC study area include local marinas located off-Reserve that provide fixed access to the rivers in the area, including the Pickerel and Key Rivers. The Canadian National and Canadian Pacific Railway lines intersect each other to the east of HIFN I.R. #2 near the Key River. From this location, the Canadian Pacific Railway line continues towards the main community settlement at French River Reserve No. 13 before crossing the Pickerel River. There is no passenger service for the community. The nearest airport to the HIWEC study area by car is the Greater Sudbury Airport located approximately 80 km north from HIFN I.R. #2. There are also a number of local aerodromes and water aerodromes to the east and north within 50 km of the HIWEC study area. Inter-city bus service is also available in both Parry Sound and Sudbury.

4.2.7.5 Telecommunication and Weather Towers

HIW has provided notices to telecommunication companies in the area and agencies operating telecommunication systems in the province to provide details on the HIWEC. To date, HIW has received confirmation from the DND, the RCMP, and Ontario Ministry of Government Services that the operation of their radio communication systems will not be impacted by the HIWEC.

There are five (5) television stations broadcasting in the vicinity of the HIWEC study area. Four (4) of the five (5) stations have converted to digital television signals which are not impacted by WTGs or transmission infrastructure. It was confirmed that one (1) television station which has service contours overlapping the HIWEC study area is still using analog signals. No FM or AM broadcast stations have been identified within proximity of proposed WTGs that could impact broadcast signals (Yves R Hamel et Associés Inc., 2011). An EC weather radar tower is located approximately 6.5 km from the HIWEC study area in Britt, Ontario. HIW will continue to engage with EC to identify and mitigate any impact on the operations of the weather radar tower.

4.2.8 Recreation and Tourism

HIFN does not have recreation facilities (e.g., community halls, baseball diamonds and campgrounds) located on HIFN I.R. #2. Access to the Reserve is limited to HIFN Band Members or individuals that have received prior authorization from HIFN. The result is limited use of the Reserve by non-Band Members. The 2011 Preliminary Constraints Analysis report identified that lands on HIFN I.R. #2 are primarily used by community members. There are approximately ten (10) leased cottage lots on Bekanon Road on the south shore of Henvey Inlet that are leased to cottages from outside the First Nation (Neegan Burnside, 2011).

HIFN recreation structures and services for its members and residents are located at the French River Reserve No. 13. HIFN built an outdoor rink in 1998 and a baseball diamond in 2000. The community also has a playground and established a small beach for residents on the southeast side of Cantin Lake. The community website identified that the beach has been improved in recent years to make it more enjoyable for residents (HIFN, 2015d).

The broader region is home to many recreational opportunities throughout the year. Portions of the Key River area are identified within the French River Provincial Park (waterway class) which is part of the French / Pickerel canoe route (Neegan Burnside, 2011). The Key River, as well as the French River and Pickerel River, are popular rivers for recreational boating, canoeing, fishing and seasonal cottage rentals.

The community is also located in close proximity to the following Provincial Parks:

- Grundy Lake Provincial Park; and
- French River Provincial Park.

These parks include camping and other recreational amenities that draw visitors to the area and provide opportunities for local businesses in the service industry including marinas at the Pickerel, Key and French Rivers, as well as the trading post at Grundy Lake Road.

Most cottagers are located along the Key River or on privately and publically owned lands off-Reserve on the Georgian Bay Islands. Some residential homes within the HIWEC study area are located on Highway 69 in the community of Still River (Neegan Burnside, 2011).

Grundy Lake Provincial Park (3,614 ha) received 104,594 visitors in 2010, with 485 developed campsites as well as other interior camping opportunities. The park has 69% camping occupancy during the peak July-August period, or

100,646 camper nights. The French River Provincial Park (73,530 ha) offers only interior camping opportunities (i.e., no developed campsites), and recorded 18,100 camper nights in 2010 (Ontario Parks, 2010).

There are also many trails and open spaces within the Parry Sound District to ride All-Terrain-Vehicles (ATVs) in the spring, summer and fall and to ride snowmobiles in the winter months. Many snowmobilers are members of a snowmobile club, which organize group rides and plan for trail maintenance. The North East Georgian Bay snowmobile club is the organization which has jurisdiction in the areas surrounding HIFN I.R. #2 (North East Georgian Bay Snowmobile Club, 2015).

The North Georgian Bay Shoreline and Islands Conservation Reserve is located to the south of the HIWEC and is an area of protected Crown land for recreation and traditional land uses. The area is protected from development.

4.2.9 Cultural Resources / Heritage and Archaeological Sites

The first human settlement in the HIWEC study area can be traced back 10,000 years; these earliest groups are referred to in archaeology as “Paleo” meaning old or ancient. The HIWEC study area has been occupied since the glaciers retreated from the land, which allowed for spruce dominated boreal forests to move quickly north, occupying the once open tundra (Hinshelwood, 2004; Phillips, 1993). In response to the natural Canadian Shield environment, the people here would have moved their encampments on a regular basis to be in the locations where these resources naturally became available and the size of the groups occupying any particular location would vary depending on the nature and size of the available food resources. Over time populations increased, but the settlement and subsistence strategy of mobile groups utilizing the rich natural resources of the area remained relatively unchanged. A pre-contact settlement chronology based on cultural and temporal history of occupations in Central Ontario is provided in the Stage 1 Archaeological Assessment Report, included as **Appendix K1**.

During the site planning process for the HIWEC, HIFN identified areas of cultural significance, including areas of past settlement as well as current settlements, and excluded them from the HIWEC study area. In order to fully understand the potential effects of the proposed HIWEC on built heritage and cultural heritage landscapes, a Heritage Assessment was completed to identify heritage resources including cultural heritage and heritage landscapes of cultural value or interest. The Heritage Assessment included research on the land use history of the HIWEC study area, cultural heritage features, cultural heritage landscapes and protected properties and is provided in **Appendix L**.

The Heritage Assessment confirmed that no listed, designated or otherwise recognized heritage features are present within the HIWEC study area or on properties abutting the study area. Additionally, there are no historical plaques, cemeteries, national historic sites or properties protected by Ontario Heritage Trust Easement. A property survey was undertaken to evaluate built heritage and cultural heritage landscapes present in the study area, and an inventory was created to identify and evaluate potential heritage resources.

Through a windshield survey, 20 structures that were determined to be more than 40 years old and having potential cultural heritage value or interest were identified. These structures include ten (10) cottages, eight (8) residences, and two (2) outbuildings. The cottages, residences and one (1) of the outbuildings are considered typical of the area and it was determined that they did not have cultural heritage value or interest. The remaining structure, Milton’s Camp, was identified as being of cultural heritage importance.

Landscapes present in the HIWEC study area include typical transportation corridors and cottage areas, as well as areas identified, but not mapped, that have heritage significance to the HIFN community. The Nishshing Aki is considered to have cultural heritage value or interest in accordance to the criteria set out in the Historic Sites and Monuments Board of Canada’s *Criteria for Evaluating Subjects of Potential National Historic Significance* (Canadian Government, 2008).

Five (5) archaeological sites were also identified within and around the HIWEC study area. Due to the sensitivity of this information, the locations and details of these sacred, heritage, and archaeological sites will not be disclosed.

The Stage 1 archaeological assessment determined that there are areas within the HIWEC study area that have the potential to retain archaeological resources. Features that contribute to archaeological potential within the HIWEC study area include the presence of natural environmental features consistent with pre-contact land use, early transportation routes, identified burial grounds, previous settlements and areas identified by the community as being of cultural significance. In addition to watercourses, historic transportation routes, early settlements, early industry, well-drained soil and proximity to archaeological features, areas that could support pictograph or quarry sites are also considered to contribute to archaeological potential. Areas of archaeological potential that may be impacted by the construction of the HIWEC infrastructure must be subject to additional Stage 2 archaeological field investigation prior to any development activities. The Stage 2 Archaeological Assessment Report is provided in **Appendix K2**.

The Stage 2 archaeological assessment involved the physical survey of all areas with archaeological potential to determine if any archaeological resources are present within the HIWEC study area and will identify which areas are free of archaeological concerns. The Stage 2 investigation involved the standard test pit assessment of the area to be impacted where soil overburden permits, as well as visual inspection of any exposed ground surfaces. The results of the field investigation, as well as proposed mitigation measures if required, and recommendations for further work are presented in a Stage 2 Archaeological Assessment Report (**Appendix K2**).

4.2.10 Noise

The HIWEC study area is a largely natural landscape with relatively few anthropogenic noise sources. The eastern portion of the study area is adjacent to Highway 69 so existing sound levels in that area are influenced by highway traffic. The HIWEC study area includes several permanent and seasonal residential areas (homes, cottages and lodges) where existing sound levels are primarily associated with residential activities, boat travel along Henvey Inlet and the Key River and natural sounds (weather, wildlife, rustling vegetation, etc.). A Noise Impact Assessment has been completed for the HIWEC and is included in **Appendix M**.

4.2.11 Visual Landscape

The visual and aesthetic importance of Georgian Bay and the HIWEC study area is reflected by the numerous artists and photographers who have captured the landscape along Georgian Bay, and the local celebration of the Canadian iconic Group of Seven which frequently captured the area's scenic landscapes in their paintings at the beginning of the 20th century. Most of the tourism based businesses within the HIWEC study area and along Georgian Bay and Key River such as resorts, lodges and marinas, heavily rely on the natural landscapes to attract vacationers, hikers and boaters.

5. Alternative Means

"Alternative means" are the various technically and economically feasible ways under consideration that would allow an undertaking to be carried out. Alternative means can include options for component locations, construction methods, routes, designs, technologies and mitigation measures.

As described in **Section 1**, Nigig received a FIT contract from the OPA in 2011 for a 300 MW wind energy centre. The consideration of "Alternative means" described below is bounded within the context of developing a 300 MW wind energy centre on HIFN I.R. #2, as per the FIT contract for the HIWEC.

Avoidance of adverse environmental effects was a key principle in designing the HIWEC. Adverse environmental effects, particularly those related to SAR and loss of wetland quantity and function were subject to a hierarchy of mitigation strategies including avoidance, minimization and compensation have been applied. 'Alternative means' outlined in the subsections below were explored based on their ability to avoid potential environmental effects and selected if implementation was technically and economically feasible. Where potential environmental effects could not be avoided, mitigation options are identified in **Section 6.3**.

5.1 HIWEC Component Layout

The layout of WTGs and associated infrastructure can influence the potential environmental effects of the HIWEC. Layout development for the HIWEC has been an iterative process throughout the planning phase starting in 2011 and utilizing feedback from environmental and technical studies to revise the layout and avoid or minimize potential environmental effects. Where potential effects could not be avoided through layout adjustments, the area of impact was minimized as much as possible through the placement of HIWEC components with the minimum potential effect on wetlands (e.g., siting crossings at narrow sections of the feature) and other important features (such as waterbodies). Compensation strategies for areas where potential effects could not be avoided are discussed in **Section 6.3**.

The original layout for the HIWEC was generated in July 2011. Key site constraints were identified and a preliminary WTG layout (WTG locations only) was generated with regard to the identified constraints. The initial list of constraints included wetlands, Georgian Bay shoreline areas (including a 500 m setback for WTGs), waterbodies, cultural areas and residents along Bekanon Road and adjacent off-Reserve residents.

Environmental studies were conducted within the HIWEC footprint from 2011 to 2013 to identify additional constraints related to wildlife presence and habitat that could inform future layout adjustments.

In September 2011, a constraints analysis was conducted by Neegan Burnside (2011) to identify additional constraints that could inform future adjustments to the layout. The Neegan Burnside (2011) report identified constraints related to biophysical, socio-economic and cultural features within the HIWEC footprint. A revised WTG layout was prepared in September 2012 to include proposed access road and water crossing locations. The revised layout was generated with regard to the constraints identified in Neegan Burnside (2011). The general principle was to place HIWEC components (i.e., WTGs, access roads and collection system) to avoid wetlands, water crossings, waterbodies and areas of socio-economic and cultural importance. The WTGs, access roads and collection system were sited in upland areas. The revised layout was used as the basis for additional field studies through 2013.

In August of 2014, the WTG layout was further refined by Nigig and Pattern based on additional analysis of wind resources and acoustic modelling. AECOM conducted an environmental and archaeological reconnaissance of the revised HIWEC layout from October to December 2014 to determine the need for any additional layout adjustments

to avoid sensitive environmental features. At the same time, RES Canada conducted a constructability review of the revised HIWEC layout to determine the need for additional adjustments to address constructability constraints, minimize access road length and minimize cut (blasting) and fill requirements.

Based on inputs from the environmental reconnaissance and constructability review, a revised layout is prepared to include revised WTG and access road locations (to minimize access road length and cut (blasting) and fill requirements), collector line, laydown areas, O&M building and TS locations. The on-Reserve transmission line was routed to avoid environmental and cultural constraints and optimize the route technically (e.g., avoid sharp turns) and economically (i.e., shortest route possible). This revised layout was the focus of detailed environmental studies in spring / summer 2015 for the HIWEC EA. The outcome of the EA could inform additional adjustments during detailed design to address any potential environmental concerns.

In August 2015, 20 WTG locations were removed from the layout to address constructability, wind resource, ecological considerations and feedback from the public through the public consultation program. The final layout for the HIWEC will only include up to 91 WTGs so approximately nine (9) additional WTG locations will be removed through the detailed design process in fall 2015.

5.2 WTG Technology Alternatives

The original 120 WTG layout for the HIWEC was based on using a 2.5 MW WTG model. A review of WTG technology alternatives indicated that larger output WTGs could be used to generate the 300 MW nameplate capacity with fewer overall WTG locations. A 3.3 MW Vestas WTG was selected as the preferred WTG technology in July 2015 as this model would reduce the number of required WTGs from 120 to up to 91. In addition to reducing the overall number of WTGs required, selection of a larger output WTG also reduces the number of access roads required and could reduce the overall footprint of the HIWEC by up to 25%. The reduction in the overall footprint by selecting a WTG with greater capacity will avoid potential environmental effects on sensitive environmental features.

5.3 Infrastructure Alternatives

A number of infrastructure alternatives have been considered for the HIWEC based on their technical, environmental and economic impact on HIWEC construction. Alternatives for watercourse crossings such as culverts or clear span bridges result in different potential effects to aquatic features and the species that rely on them for their life cycle requirements. Two (2) sensitive watercourse crossings have been identified during the detailed environmental studies conducted in 2015. Although substantially more expensive to construct, installing clear span bridges at these locations will avoid most potential effects to this habitat, therefore, HIW has committed to installing clear span bridges in these sensitive locations (refer to mitigation measures in **Section 6.3**).

Installing access roads has the potential to affect wildlife habitat and movement throughout the HIWEC. HIW is committed to road design alternatives including the installation of wildlife passages and fencing in areas of high wildlife activity to mitigate potential impacts to wildlife movement within the HIWEC study area (refer to mitigation measures in **Section 6.3**).

Another infrastructure alternative is the installation of the collector system either above or below ground. In a fractured bedrock environment like HIFN I.R. #2, installation of below ground collector lines would require extensive blasting which would be cost prohibitive and could result in additional disturbance to wildlife and the public. For these reasons, HIW will primarily install aboveground collector lines. Installation of aboveground collector lines will reduce blasting requirements and avoid some of the potential environmental effects associated with blasting.

There are alternative means of installing WTG foundations that can have different potential environmental effects in a fractured bedrock environment. Spread foot foundations would require a large amount of blasting to prepare the foundation excavation. Rock anchor foundations can be used to reduce the amount of blasting (and associated environmental effects) by anchoring the foundation directly into the rock. Rock anchor foundations have been identified as a preferred design in this type of environment and additional design adjustments may be explored further during detailed design. Installation of rock anchor foundations will reduce blasting requirements (compared to spread foot foundations) and avoid some of the potential environmental effects associated with blasting.

Additional mitigation alternatives have been considered in relation to construction methods to further minimize potential impacts to wildlife (refer to **Section 6.3**). Experienced wildlife monitors will be on-site with construction crews to ensure the implementation of construction mitigation including sweeping active construction areas prior to equipment access to identify and avoid any wildlife species that might be using these areas prior to construction.

In addition, construction scheduling has been modified to avoid sensitive fish and wildlife habitat during specific time periods (refer to mitigation measures in **Section 6.3**).

5.4 Blasting Alternatives

During the planning phase, a constructability review was undertaken. During this process, alternatives for the removal of rock were assessed. The alternative methods of rock removal are jackhammering and blasting (using explosives).

Blasting was chosen as the preferred alternative as jackhammering would extend the schedule, and is impractical due to the inefficiencies associated with small-scale rock removal. In addition, jackhammering would cause greater noise impacts over a longer period of time.

The use of blasting is expected to decrease the time period of disturbance, including noise, and improve efficiencies, resulting in less negative effects to SAR.

5.5 Detailed Design and Follow-up

HIW will continue to explore avoidance alternatives during detailed design based on the outcome of the EA and regulatory permitting. As part of the SAR permitting process with EC-CWS, HIW will delineate critical habitat for SAR. Critical habitat mapping and detailed wetland mapping will be reviewed with the construction team to identify additional opportunities to avoid critical habitat by shifting HIWEC component (e.g., access roads) within the footprint studied to less sensitive locations if the opportunity presents itself. Where construction activity in sensitive habitat is unavoidable, site specific mitigation measures, such as avoiding construction during sensitive periods (e.g., breeding bird windows and turtle nesting periods) will be implemented to minimize potential effects (refer to **Section 6.3** for detailed mitigation options). Additional avoidance, mitigation and compensation (if required) will be explored during the SAR permitting process with EC-CWS.

Once construction is underway monitoring and follow-up programs will be implemented to determine the effectiveness of mitigation measures. Based on the results of monitoring and follow-up programs, adaptive management measures may be implemented (e.g., installation of additional wildlife passages or signage to alert workers to the presence of sensitive species or habitat) if follow-up indicates the need for additional management action to address HIWEC environmental effects. The Environmental Protection Plan (EPP) will include a detailed description of the adaptive management program including triggers for additional management action and the specific actions that would be taken to address HIWEC environmental effects.

6. Effects Assessment

The effects assessment in the following sections is structured following the EA methods described in **Section 3**. First, potential environmental effects are discussed in **Section 6.2**. Second, mitigation of potential environmental effects and prediction of residual environmental effects are presented in **Section 6.3**. Residual environmental effects are characterized and their significance is evaluated in **Section 6.4**. Lastly, proposed monitoring and follow-up plans are discussed in **Section 8**.

6.1 Interaction with Valued Ecosystem Components, Nishshing Aki and Other Components

The HIFN EA Guidance document requirements and the following were used to determine if there was an interaction between the HIWEC and the biophysical and / or socio-economic environments:

- Input from HIFN;
- Federal and provincial law and guidance;
- Scientific or academic publications;
- Input from the public; and
- Professional judgment of the assessment practitioners, based on experience with similar projects.

The HIWEC-Environment Interactions Matrix is presented in **Table 6-1** below. The Interactions Matrix provides a summary of potential interactions between HIWEC activities occurring during construction / decommissioning and operations and VECs, Nishshing Aki, and Other Components. A complete discussion of interactions (i.e., potential effects pathways) is provided for each VEC and Other Components in **Section 6.2**.

The HIWEC was designed to avoid effects on Nishshing Aki. Therefore, Nishshing Aki is not carried forward in the effects assessment because no adverse effects are anticipated.

Table 6-1: HIWEC-Environment Interactions Matrix

	Valued Ecosystem Components											Nishshing Aki			Other Components			
	Soils and Terrain	Groundwater	Wildlife and Wildlife Habitat	Vegetation and Ecological Communities	Surface Water	Fish and Fish Habitat	Species at Risk	Land and Resources Used for Traditional Purposes by Aboriginal Persons	Cultural Resources / Heritage and Archaeological Sites	Noise	Visual Landscape	Sacred Sites	Burial Grounds	Old Settlements	Air Quality	Local Residents, Cottagers and Businesses	Recreation and Tourism	Community Services and Infrastructure
Construction Phase																		
Site Preparation • Delineation of work area and installation of erosion and sediment control measures • Vegetation clearing and site grading • Delineation and preparation of temporary work areas	X	X	X	X	X	X	X	X	X	X					X	X	X	
Construction of Access Roads and Laydown Areas • Construction of access roads as required (including blasting) • Installation of temporary facilities including concrete batch plant(s), crusher(s), WTG staging areas, construction compounds and laydown yards	X	X	X	X	X	X	X	X	X	X					X	X	X	X
Transportation of Equipment and Materials • On-site delivery of construction vehicles, equipment and materials			X		X	X	X	X		X					X	X	X	X
Foundation Excavation and Construction • Installation (includes excavation, blasting and construction as required) of WTG foundations • Installation (includes excavation, blasting and construction as required) of crane pads • Installation (includes excavation, blasting and construction as required) of pad-mounted transformers • Installation (includes excavation, blasting and construction as required) of TS foundations • Installation (includes excavation, blasting and construction as required) of O&M foundation and building	X	X	X	X	X	X	X	X	X	X					X	X	X	X
WTG Installation • Erection of WTGs			X				X	X		X					X	X	X	
Collector System and Transmission Line Installation • Installation of above and / or below ground electrical collector lines • Installation of on-Reserve transmission infrastructure	X	X	X	X	X	X	X	X	X	X					X	X	X	X
Installation of TSs	X	X	X	X	X	X	X	X	X	X					X	X	X	
Construction Completion • Reclamation of temporary construction areas • Demobilization of construction works	X		X	X	X	X	X	X		X					X	X	X	X
Power Connection and Commissioning																		
Operations and Maintenance Phase																		
HIWEC Operation • WTG operation • Meter calibrations • Met tower data acquisition		X	X				X	X	X	X	X					X	X	X

Table 6-1: HIWEC-Environment Interactions Matrix

	Valued Ecosystem Components											Nishshing Aki			Other Components			
	Soils and Terrain	Groundwater	Wildlife and Wildlife Habitat	Vegetation and Ecological Communities	Surface Water	Fish and Fish Habitat	Species at Risk	Land and Resources Used for Traditional Purposes by Aboriginal Persons	Cultural Resources / Heritage and Archaeological Sites	Noise	Visual Landscape	Sacred Sites	Burial Grounds	Old Settlements	Air Quality	Local Residents, Cottagers and Businesses	Recreation and Tourism	Community Services and Infrastructure
WTG, Collector System, Road and Crossing Repair / Maintenance • Preventative and unplanned maintenance of HIWEC components (includes accessing such components) • Maintenance of the collector system and any on-Reserve transmission lines (includes accessing such components) • Access road maintenance	X	X	X	X	X	X	X	X	X	X					X	X	X	X
Environmental Monitoring			X	X			X	X	X	X					X	X	X	
Decommissioning Phase																		
Power Disconnection and Decommissioning of Service • Disconnection of collector TSs			X				X	X		X					X	X	X	
Transportation of Materials • On-site delivery of decommissioning vehicles and equipment • Removal of HIWEC components and infrastructure from site			X		X	X	X	X		X					X	X	X	X
Disassembly and Removal of Collector System Components • Disassembly and removal of collector TSs • Disassembly and removal of pad-mounted transformers • Disassembly and removal of above and / or below ground electrical collector lines • Disassembly and removal of on-Reserve transmission infrastructure			X	X	X	X	X	X		X					X	X	X	X
WTG and / or Tower Disassembly and Removal • Disassembly and removal of WTG infrastructure • Disassembly and removal of Met towers			X				X	X		X					X	X	X	
Disassembly and Removal of O&M Building Infrastructure			X				X	X		X					X	X	X	X
Decommissioning Completion • Reclamation of disturbed areas (includes reclamation of access roads, as required) • Grading of concrete foundations • Demobilization of decommissioning works	X		X	X	X	X	X	X		X					X	X	X	X

6.2 Potential Environmental Effects

The following sections describe how the HIWEC could result in potential environmental effects (i.e., the effects pathways). Where appropriate, the potential effects pathways for each phase of the HIWEC (i.e., construction / decommissioning and operations) are discussed.

6.2.1 Soils and Terrain

6.2.1.1 Construction and Decommissioning

Potential effects on soils and terrain during construction and decommissioning of the HIWEC include:

- Changes to soil quality; and
- Changes to soil quantity.

Construction activities (e.g., excavation, use of heavy equipment, stockpiling of cleared materials, and dewatering discharge) have the potential to cause changes in soil quality through processes such as admixing, soil compaction and rutting, and erosion leading to an alteration of soil capability. Although topsoil is thin and / or not present at many locations throughout the HIWEC study area, there will be an opportunity to salvage topsoil in some areas and admixing of strippings and subsoil could occur during construction if soil handling occurs during wet or thawed ground conditions. Mixing of strippings material with spoil piles could occur during site preparation if adequate separation of the piles is not ensured. General construction activities such as vehicle and machinery operation and concrete truck rinsing also have the potential to change soil quality through minor contaminant releases.

Inadequate stripping of topsoil and upper subsoil, or careless stockpiling, can cause changes to soil thickness and quantity from soil loss. Reduced soil thickness, can lead to reduced soil productivity resulting from reduced medium for plant growth. Reduced soil thickness can negatively affect soil fertility status, depth of topsoil, and rooting zone. Degradation of soil structure may occur due to compaction, if traffic and handling occur when soils are wet.

Soil exposure during construction and reclamation might also lead to increased wind and water erosion risk. An increase of impervious surface area from construction activities may result in an increase in surface runoff. Inadequate control of surface runoff from construction areas and dewatering discharge has potential to cause soil erosion resulting in a soil loss. Effects of water erosion on soil include changes in soil quality, structure, and stability and texture. The removal of fine-textured particles in the soil can result in a textural change, affecting the water-holding capacity and making it more susceptible to drought conditions (Ritter, 2012). Effects of soil erosion often have corresponding effects to receiving waterbodies and / or wetlands as soils redistribute to these features. Refer to **Section 6.2.4** and **Section 6.2.5** for a discussion of effects pathways on wetlands and surface water, respectively.

Should dewatering activities be required, soil quality and quantity may be affected through the release of construction dewatering discharge. Blasting of bedrock during construction has the potential to increase the risk for rock slope instability resulting in soil erosion. Changes in rock and soil slope stability also results in a change in surface water drainage at blast sites. Refer to **Section 6.2.5** for a discussion of effects pathways on surface water.

Mitigation measures are proposed in **Section 6.3** to avoid or minimize potential effects on soils and terrain.

6.2.1.2 Operations

General operations activities such as vehicle and machinery use have the potential to change soil quality through minor contaminant releases and soil compaction and rutting. No other effects on soils and terrain are anticipated during operations, as vegetation clearing for maintenance purposes will be kept to a minimum.

Mitigation measures are proposed in **Section 6.3** to avoid or minimize potential effects on soils and terrain.

6.2.2 Groundwater

6.2.2.1 Construction and Decommissioning

Potential effects on groundwater during construction and decommissioning of the HIWEC include:

- Changes in groundwater quantity; and
- Changes in groundwater quality.

Construction activities such as dewatering, water taking activities, and the creation of impervious surfaces have the potential to change groundwater quantity resulting in decreases in baseflow of watercourses, groundwater discharge to wetlands, yield of private water wells, and groundwater flow pattern. Where dewatering occurs, local water table elevations may be temporarily lowered during construction. Private water wells located within the dewatering zone of influence have the potential to be effected by water taking activities should the water taking activities result in lowered groundwater levels. A reduction in well yield resulting in the inability to use the well as a potable water source may result. Estimates of water taking quantities and related dewatering zones of influence have not been calculated and will be deferred to the detailed design stage.

Blasting of bedrock that might be required to support construction of the HIWEC also has the potential to change groundwater quantity. In rare cases, vibrations from blasting in bedrock can alter the fracture geometry, open new fractures, change the aperture of existing fractures, or permanently change the local groundwater flow patterns.

Construction dewatering has the potential to change groundwater quality in areas of substantial groundwater recharge through the potential release of contaminated construction dewatering discharge. Blasting and pile driving also have the potential to change groundwater quality and physically damage groundwater supply wells through agitation of subsurface conditions and the potential release of fine particulate and / or soluble substances. General construction activities such as vehicle and machinery operation and concrete truck rinsing also have the potential to change groundwater quality through minor contaminant releases.

Mitigation measures are proposed in **Section 6.3** to avoid or minimize potential effects on groundwater.

6.2.2.2 Operations

Potential effects on groundwater during operations of the HIWEC include:

- Changes in groundwater quantity; and
- Changes in groundwater quality.

The creation of impervious surfaces (e.g., WTG foundations, access roads, and buildings) has the potential to reduce groundwater quantity through a minor reduction in groundwater recharge. There is a greater potential to affect groundwater quantity from reduction in recharge in areas where coarse-textured glaciolacustrine deposits of sand and gravel exist at surface due to the limited extent and depth of these deposits.

Private water wells drawing water from surficial sand deposits were identified within the HIWEC study area. However, water taking activities during the operations phase is restricted to quantities not exceeding 50,000 L/day and are confined to the TS area and O&M building, located more than 3 km from any known actively used private water well. Adverse effects on local groundwater users (landowners) and natural ecological features are not known to occur from the operation of groundwater supply wells at such low rates.

General operations activities such as vehicle and machinery operation have the potential to change groundwater quality through minor contaminant releases.

Mitigation measures are proposed in **Section 6.3** to avoid or minimize potential effects on groundwater.

6.2.3 Wildlife and Wildlife Habitat

6.2.3.1 Construction and Decommissioning

Potential effects on wildlife and wildlife habitat (including SOCC) during construction and decommissioning of the HIWEC include:

- Habitat change (including possible damage, loss, destruction and / or fragmentation);
- Change in mortality risk (including harm, harassment and /or killing of wildlife); and
- Change in behaviour.

These potential effects are discussed in further detail in the subsections that follow.

6.2.3.1.1 Habitat Change

Direct habitat loss and fragmentation will result from the HIWEC construction footprint and will occur during site preparation (e.g., vegetation clearing and site grading) and construction activities (e.g., blasting). Road networks constructed to service WTGs often result in habitat fragmentation and have been associated with negative effects on biodiversity (Kuvlesky, *et al.* 2007). Any direct habitat loss within the HIWEC may result in a loss of habitat for several SOCC including Black Tern, Common Five-lined Skink, Eastern Ribbonsnake, Eastern Wolf, Eastern Wood-pewee, Horned Clubtail, Milksnake, Mottled Darner, Northern Map Turtle, Pine Imperial Moth, Prairie Warbler, Snapping Turtle, Wood Thrush and Yellow Rail.

In addition to direct habitat loss, habitat degradation may occur as a result of site preparation (e.g., vegetation clearing), construction of access roads and laydown areas, transportation of equipment and materials, foundation excavation and construction, collector system and transmission line installation, TS installation, construction completion, and decommissioning activities. These activities may negatively affect wildlife habitat, including habitat for SOCC through increased erosion and sedimentation, soil removal / disturbance and compaction, accidental soil or water contamination by oils, gasoline, grease and other materials from construction equipment and materials storage or handling, changes in surface water drainage patterns or obstruction of lateral flows in surface water resulting from land contour changes, and reductions in groundwater recharge quantities due to increased impervious surfaces. Dewatering activities and associated dewatering discharge may also negatively affect wildlife habitat, particularly in wetlands and other wildlife habitat features dependant on surface water or groundwater (e.g., amphibian breeding habitat, turtle overwintering habitat).

The entire HIWEC study area provides habitat for a variety of different wildlife species, including SAR. Construction within the HIWEC footprint has the potential to kill, harm or harass wildlife that may be using the area as habitat (e.g., for nesting or feeding). Construction within the HIWEC footprint may also damage and destroy portions of wildlife habitat, including residences for SAR. Fragmentation of wildlife habitat is possible due to the construction of access roads, transmission lines, WTGs and laydown areas. The impediments to movement of species (e.g., snakes) resulting from this fragmentation may result in reduced species richness and abundance (Fenech, *et al*. 2000). These potential effects as they relate to SAR habitat change and mortality are addressed under the VEC (**Section 6.2.7**), and therefore are not addressed here.

6.2.3.1.2 Change in Mortality Risk

Vegetation removal, blasting and sub-surface excavation activities, and dewatering will occur during construction activities for the construction of WTGs, access roads, laydown areas, the collector system and transmission lines. During these construction activities, there is a higher potential for accidental wildlife mortality. Bird nest mortality may occur when vegetation is removed during site preparation as well as during blasting activities if suitable habitat exists within the blast zone. Increased mortality risk as a result of HIWEC construction is of particular concern during sensitive life stages (e.g., breeding season, hibernation). Wildlife, particularly turtles and snakes (including Eastern Ribbonsnake, Milksnake, Northern Map Turtle, Five-lined Skink and Snapping Turtle), may also experience an increased mortality risk on access roads during construction and decommissioning, resulting from collisions with vehicles and heavy equipment and vegetation clearing. A range of scientific studies that have assessed the impacts of roads on wildlife suggest that road-facilitated wildlife mortality can be a major source of mortality in vertebrates, and the leading cause of anthropogenic mortality (Forman and Alexander, 1998). Snakes experience the largest increase in mortality from vehicles due to their large home ranges and tendency to move quickly across great distances in search of seasonal resources (Jochimsen, *et al.* 2004).

6.2.3.1.3 Change in Behaviour

Displacement of wildlife through loss of habitat may occur during construction of the HIWEC when habitat is removed for the construction of WTGs, access roads, laydown areas, the collector system and transmission line. Forested habitats are generally associated with a higher number of bird nests per hectare; therefore, the removal of these habitats would result in the displacement of more breeding pairs per hectare compared to other habitats such as grasslands or agricultural fields (Calvert, *et al.* 2013).

Dewatering activities and associated dewatering discharge may also result in the displacement or avoidance behaviour of wildlife, particularly if water levels in wetlands and other wildlife habitat features dependant on surface water or groundwater (e.g., amphibian breeding habitat, turtle overwintering habitat) are affected during sensitive life stages (e.g., breeding season, hibernation).

Noise and human presence associated with construction and decommissioning activities of the HIWEC have the potential to change wildlife behaviour through disturbance of wildlife. Disturbance to birds during site preparation (e.g., vegetation clearing), construction of access roads, laydown areas and transmission lines, foundation excavation (including blasting activities), and decommissioning, may result in a decreased breeding success for nesting birds (Environment Canada, 2014). Disturbed nesting birds (including Black Tern, Eastern Wood-pewee, Prairie Warbler, Wood Thrush, and Yellow Rail) may spend more time off the nest which could result in nest predation, nest exposure to cold temperatures and wet conditions, malnourished chicks, premature fledging, and nest abandonment (Environment Canada, 2014). Noise can interfere with auditory communication between and within species, resulting in the disruption of normal social interactions, and can compromise their ability to perceive important auditory cues from their environment (Hall, *et al.* 2000). The disruption of mating vocalizations (territorial singing) of songbirds and lekking behaviour by noise, including construction noise, is linked to decreased nesting success in impacted species (e.g., Habib, *et al.* 2007; Francis, *et al.* 2009, 2011 and 2012; Blickley, *et al.* 2012). Construction-related disturbance has been shown to significantly decrease the densities (Burton, *et al.* 2002; Pearce-Higgins, *et al.* 2012) and nesting success of several species of birds (e.g., Stuart-Smith, *et al.* 2012). Other documented instances of the adverse effects of construction disturbance on wildlife include abandonment of dens by bears if the disturbance is within 2 km of the den (Linnell, *et al.* 2000), decreased calving success among elk (Shively, *et al.* 2005), and avoidance of construction areas by Caribou and other ungulates (Dyer, *et al.* 2001; Weir, *et al.* 2007; Helldin and Alvares, 2011; Helldin, *et al.* 2012). Similar denning site disturbance may be observed for the Eastern Wolf, identified as a SOCC in the HIWEC study area.

Within the HIWEC study area, large mammal (e.g., cervids, bears and wolves) movement is currently not impeded nor confined by any barriers. Large mammals are able to move in any direction or broadly across the landscape. At a landscape scale, the construction of gravel access roads that are approximately 15 m wide is not anticipated to permanently affect or interfere with large mammal movement given the area encompassed by the HIWEC study area. Some localized disturbance associated with more frequent use of access roads during construction may occur due to the level of noise produced by construction vehicles but it would be considered to be temporary. Furthermore, use of access roads during operations is expected to be infrequent and will not affect large mammal movement.

Mitigation measures are proposed in **Section 6.3** to avoid or minimize potential effects on wildlife and wildlife habitat.

6.2.3.2 Operations

Potential effects on wildlife and wildlife habitat (including SOCC) during operations of the HIWEC include:

- Change in mortality risk; and
- Change in behaviour.

These potential effects are discussed in further detail in the subsections that follow.

6.2.3.2.1 Change to Mortality Risk

The operation of WTGs at the HIWEC may increase mortality to bird and bat species assemblages (including Black Tern, Eastern wood-pewee, Prairie Warbler, Wood Thrush and Yellow Rail). However, WTG collision mortality at wind farms is generally considered to be too low to impact bird populations, and is estimated to account for < 1 to 2% of all avian mortalities resulting from collisions with manmade structures and other human-caused bird mortality (Erickson, *et al.* 2001; MNRF, 2011a; Calvert, *et al.* 2013). The MNRF has estimated that wind WTGs in Ontario result in the mortality of, on average, two (2) to three (3) birds / WTG / year (MNRF, 2011a). According to the Wind Energy Bird and Bat Monitoring Database (BSC *et al.*, 2014), the average annual bird mortality estimate is 5.45 birds / WTG / year in Ontario based on data collected from 50 wind projects between 2006 and 2012(EC, *et al*. 2014). Another recent review of bird mortality at 43 wind projects across Canada calculated an average mortality rate of eight (8) birds / WTG / year, which was considered unlikely to result in population-level impacts provided that highly sensitive or rare habitats as well as concentrated areas of SAR were avoided (Zimmerling, *et al.* 2013).

Baseline field programs within the HIWEC study area have revealed the presence of sensitive habitats including wetlands and a generally high abundance and species diversity of birds, including bird SAR. Further discussion on potential population-level effects on SAR is provided in **Section 6.2.7**.

Bird mortality resulting from collisions with WTGs generally appears to be higher when wind projects are located where migratory birds are concentrated, such as sites near large bodies of water or within largely forested landscapes (Erickson, *et al.* 2001; Kuvlesky, *et al.* 2007; Calvert, *et al.* 2013).Passerines, particularly nocturnal migrants, account for the vast majority of bird collisions with WTGs, but at rates that are generally considered to be too low to have population-level effects; however, mortality is more likely to have population-level impacts on raptors because populations of these longer-lived species cannot absorb mortalities as easily as passerines (Erickson, *et al.* 2001; Kuvlesky, *et al.* 2007).

The MNRF has estimated that WTGs in Ontario result in the mortality of, on average, 14 bats / WTG / year; however, mortality varies considerably across wind projects (MNRF, 2011b). According to the Wind Energy Bird and Bat Monitoring Database (EC *et al.*, 2014), the average annual bat mortality estimate is 19.08 bats / WTG / year based on data collected between 2006 and 2012 from 50 wind power projects in Ontario. Considering this

data, the operation of WTGs has the potential to increase mortality of bats during operation of the HIWEC. However, the mitigation measures proposed in **Section 6.3** will reduce the effect on bat populations associated with the operation of the HIWEC.

The HIWEC collector system and transmission lines represent a collision and electrocution risk to birds, particularly raptors as well as water birds where constructed close to wetlands (Kuvlesky, *et al.* 2007). Collisions with power lines are generally estimated to account for higher bird mortality than collisions with WTGs, although accurate mortality rates for power line collisions are difficult to calculate (Erickson, *et al.* 2001; Calvert, *et al.* 2013).

Operation of the HIWEC access roads have the potential to increase mortality risk of wildlife from vehicular collisions, particularly for mammals, turtles, snakes, lizards, and birds (Kuvlesky, *et al.* 2007). Snakes, turtles and amphibians (including Common Five-lined Skink, Eastern Ribbonsnake, Milksnake, Northern Map Turtle and Snapping Turtle) are particularly sensitive to road mortality associated with migrating between wintering sites and breeding areas. Amphibians migrate in greater numbers at night, in particular during precipitation events, which is when the greatest mortalities would be expected to occur. Grading of HIWEC roads and other road maintenance activities have the potential to increase the mortality of female turtles and turtle nests, since turtles may nest on the shoulders of gravel roads.

Lighting schemes used to light WTGs during the operation of the HIWEC have the potential to increase mortality of birds through collisions with WTGs. Several studies have shown that the Federal Aviation Administration lighting installed on commercial WTGs in the USA does not increase collision risk to bats and migrating songbirds compared to unlit WTGs (National Wind Coordinating Collaborative (NWCC), 2010; American Wind Wildlife Institute (AWWI), 2014). Studies also suggest that red strobe or strobe-like lights on WTGs do not seem to attract night migrating songbirds (Kerlinger, *et al.* 2010). White strobe lights have been reported to be very bright, conspicuous and noxious to people compared to red strobe lighting (Kerlinger, *et al*. 2010). The lighting requirements of Transport Canada include red flashing lights installed on top of the WTG towers (and not on the blades) spaced at least 900 m on specified WTGs along the perimeter of the wind farm (Transport Canada, 2014; Canadian Wind Energy Association (CanWEA), 2009). This system ensures minimal impacts on wildlife, and reduces the amount of lighting to retain an inconspicuous view for communities (CanWEA, 2009).

Finally, vegetation removal or during routine maintenance of the overhead collector lines or transmission line is also associated with increased mortality risk to wildlife including birds, amphibians and reptiles. The potential effects for these activities are similar to those described above for vegetation removal during construction and decommissioning, although they will be limited to areas that were already disturbed during the construction phase.

6.2.3.2.2 Changes to Behaviour

There is the potential that operation of WTGs at the HIWEC will result minor and / or occasional disturbance to bird species although there is limited literature on the effects of WTG disturbance, based on sound and / or vibration. Those studies that have been conducted appear to generally show little or no behavioural impact of WTGs on various bird species, although this apparent lack of evidence may also reflect deficiencies in the type or intensity of monitoring (Kingsley and Whittam, 2007).

Several studies have suggested that wind project development may have disturbance effects on migrating and breeding waterfowl and shorebirds; habitat use by water birds may decrease in proximity to (i.e., within 100 to 300 m of) onshore WTGs (Kuvlesky, *et al.* 2007). Several studies have also found that fewer birds use natural areas in the vicinity of WTGs compared to control areas without WTGs (Kuvlesky, *et al.* 2007). This may be the result of avoidance behaviour in response to disturbance from WTGs, or habitat loss associated with construction. Waterfowl noted to occur within the HIWEC study area may demonstrate avoidance behaviour during operation of the WTGs.

Other studies suggest that the behaviour of some wildlife species can be influenced by active WTG operation; for example, squirrels may exhibit elevated levels of vigilance and caution (Kikuchi, 2008). It is assumed but not conclusively proven that behavioural change is caused by noise rather than other factors (Rabin, *et al.* 2006). Other studies suggest that because noise from sources other than WTGs, such as traffic, is documented to have negative effects on certain wildlife species at varying distances from the noise source, WTGs are likely to have similar effects (U.S. Fish & Wildlife Service, n.d.). Use of access roads during maintenance activities as well as the operation of WTGs may result in some behavioural changes in wildlife species due to the level of noise they produce.

The operation of WTGs at the HIWEC location will not likely cause disturbance effects to ungulate species. A study of the effect of WTG operation on deer and other game animals found no evidence of different habitat use or distribution in areas with operating wind farms, and that the number of scats and tracks was similar for all distances (10 m to 1,000 m) from WTGs (Menzel and Pohlmeyer, 1999). Similarly, studies of the effect of wind WTG operation on domestic reindeer have found no evidence of avoidance or changes in behaviour indicative of fear or stress from noise or visual effects (Flydal, *et al*. 2004). There is some evidence that White-tailed Deer will avoid high traffic roads (Helldin, *et al*. 2012); however, vehicular travel on access roads during operations is expected to be infrequent.

Lighting systems used for HIWEC operations have the potential to affect bat behaviour. Artificial light attracts insects and in turn can result in increased bat feeding activity in artificially illuminated areas (Rydell, 1992); however, this is not true for all bat species. Some bats have been shown to avoid illuminated areas, likely due to an increased risk of predation (McGuire and Fenton, 2010).

Mitigation measures are proposed in **Section 6.3** to avoid or minimize potential effects on wildlife and wildlife habitat.

6.2.4 Vegetation and Ecological Communities

6.2.4.1 Construction and Decommissioning

Potential effects on vegetation and ecological communities during construction and decommissioning of the HIWEC include:

- Change in community diversity (including community loss);
- Change in wetland quantity and function; and
- Change in species diversity.

These potential effects are discussed in further detail in the subsections that follow.

6.2.4.1.1 Change in Community Diversity (Including Community Loss)

Clearing and grubbing will be required for site preparation for HIWEC infrastructure (e.g., access road, WTG, laydown areas and transmission line construction). This will result in the removal of vegetation, including in forested and wetland areas. These activities have the potential to change the form and function of the vegetation communities, will result in the permanent loss of forest cover within the HIWEC study area and may result in the permanent removal of old growth forest.

Old growth forests, particularly those composed of coniferous species, have a high value both ecologically and economically in North America (Chen, *et al.* 1992). Old growth forests have been reduced in size and number by anthropogenic activities, primarily clear cutting (Chen, *et al.* 1992). This has resulted in small patches of isolated old

growth forest with an abundance of edge habitats. Construction of access roads and collector lines, the transmission line, WTGs and laydown area for the HIWEC are proposed to occur within potential old growth forest. These construction activities may result in the permanent loss and fragmentation of old growth forest. Evidence suggests that a high number of snags and fallen trees occur along the edges of old growth forests (Chen, *et al.* 1992). This edge effect can extend anywhere from 0 to 137 m from the edge of forest (Chen, *et al.*, 1992). Old growth forests within the HIWEC may experience these edge effects along the cleared boundaries of access roads and collector lines, the transmission line, WTGs and laydown area which are proposed within potential old growth forest.

Vegetation communities may also be degraded as a result of site preparation (e.g., vegetation clearing), construction of access roads and laydown areas, transportation of equipment and materials, foundation excavation and construction, collector system and transmission line installation, TS installation, construction completion and decommissioning activities. These activities may negatively affect vegetation through increased erosion and sedimentation, and accidental soil or water contamination from construction equipment and materials storage or handling.

6.2.4.1.2 Change in Wetland Quantity and Function

During site preparation, clearing and grubbing of vegetation within and along wetlands will be required for the construction of HIWEC infrastructure (e.g., access roads and collector lines, WTGs, laydown areas, transmission line). This will result in a permanent loss of wetland vegetation. Four (4) important wetland complexes, encompassing a total area of 2,445 ha, were identified within HHIFN I.R. #2. Of these, up to 24.5 ha of wetlands will be removed during HIWEC construction, which comprises 1% of wetlands within HIFN I.R. #2. Construction and decommissioning activities also have the potential to change the function of the wetlands adjacent to the HIWEC footprint.

Construction of access roads and laydown areas, and WTG foundation excavation may alter surface water drainage patterns or obstruct the lateral flow of surface water to wetlands. Construction of harder, more compact surfaces (e.g., access roads, WTG foundations) may result in changes to surface water drainage patterns which can alter microclimates resulting in an alteration of species composition within wetlands (Hobbs and Humphries, 1995). Alteration of soil moisture within wetlands may also occur if construction activities result in land contour changes, which may change surface water drainage patterns and reduce groundwater upwelling.

Construction of access roads, laydown areas, transmission line and WTGs, as well as decommissioning activities occurring adjacent to wetlands may result in erosion and sedimentation, dust, as well as the accidental discharge of contaminants into wetlands. This can affect the biochemical function of a wetland. The accumulation of sediments in wetlands can alter species composition and abundance by changing nutrient concentrations, which may reduce available dissolved oxygen (Tilman, *et al.* 1997). Enrichment of wetlands with nitrogen can lead to changes in plant species composition (Wetzel and Valk, 1998). Bogs and fens, which are low nutrient wetlands, are the most sensitive to the addition of nitrogen, which can result in the loss of suitable habitat for wetland plants that have specific microclimates and are adapted to low nutrient conditions (Moore, *et al.* 1989).

The wetlands within the HIWEC study area serve the primary function of providing habitat for SAR (particularly turtles and snakes) and other wildlife species. Construction within wetlands has the potential to kill, harm or harass species that may be using the wetland as habitat (e.g., for hibernation or feeding). Construction within wetlands may also damage and destroy portions of wetlands that act as habitat or residences for SAR. Fragmentation of wetlands is possible due to the construction of access roads, transmission lines, WTGs and laydown areas. The impediments to movement of species (e.g., turtles) resulting from this fragmentation may result in reduced species richness and abundance, thus affecting wetland function (Harris, 1988). These potential effects related to wetland functions are addressed under the wildlife and wildlife habitat VEC (**Section 6.2.3**) and SAR VEC (**Section 6.2.7**), and therefore are not addressed here.

6.2.4.1.3 Change in Species Diversity

Construction and decommissioning activities in and around wetlands (e.g., use of access roads and laydown areas, WTG foundation excavation, blasting, etc.) have the potential to create high levels of dust which may enter wetlands. Dust may damage wetland plants primarily through physical effects such as cell destruction and blocked stomata (Spellerberg, 1998). Dust accumulation on plants may also affect photosynthesis, respiration and transpiration, which are important processes required for plant survival (Farmer, 1993).

Mitigation measures are proposed in **Section 6.3** to avoid or minimize potential effects on vegetation and ecological communities.

6.2.4.2 Operations

Potential effects on vegetation and ecological communities during construction and decommissioning of the HIWEC include:

- Change in community diversity (including community loss); and
- Change in wetland quantity and function.

These potential effects are discussed in further detail in the subsections that follow.

6.2.4.2.1 Change in Community Diversity (Including Community Loss)

General maintenance activities during operation of HIWEC infrastructure (e.g., collector system, access roads and transmission line) will require ongoing vegetation clearing. This will result in some removal of vegetation in areas already disturbed during construction. These activities have the potential to change the quality of adjacent and / or rehabilitated ecological communities during operation of the HIWEC. Clearing of vegetation can allow for more sun-tolerant species, often non-native, to establish, which may out-compete native shade-dependent species (Hobbs and Humphries, 1995; Hobbs & Yates, 2003). The introduction of invasive species may have a strong negative effect on native vegetation communities (Dukes, 2002). Loss of vegetation cover as a result of vegetation clearing for HIWEC maintenance activities has the potential to facilitate the introduction of non-native species primarily by altering habitat conditions (e.g., sunlight availability, hydrology, etc.), making the site more suitable for introduction. Access roads, collector lines and the transmission line may also and act as corridors for dispersal of non-native species by anthropogenic and animal routes (Trombulak and Frissell, 2000). Road networks constructed to service WTGs have been associated with negative effects on biodiversity, including through the introduction of non-indigenous plants (Kuvlesky, *et al.* 2007).

Access road and crossing maintenance, as well as general access road use, have the potential to result in soil or water contamination from accidental spills. Contaminated soil or water that enters vegetation communities can affect both species and community diversity. Soil or water contamination may occur from the introduction of oils, gasoline, grease and other materials from maintenance equipment, other vehicles and materials storage and handling.

6.2.4.2.2 Change in Wetland Quantity and Function

General maintenance activities during operation of HIWEC infrastructure (e.g., collector system, access roads and transmission line) will require ongoing vegetation clearing, which may result in the introduction or spread of invasive species as described above. The introduction of invasive species may have a strong negative effect on wetlands (Dukes, 2002). Wetlands are particularly susceptible to invasive species due to their low canopy cover and specific microclimate conditions (Detenbeck, *et al.* 1999). Depending on the invasive species and the initial condition of the wetland, the introduction of these species can result in a loss of native biodiversity (Sheldon, *et al.* 2005). The HIWEC access roads and other cleared areas (e.g., associated with collector lines or the transmission line) have

the potential to introduce non-native species primarily by altering habitat conditions (sunlight availability, hydrology etc.) making the site more suitable for introduction, and acting as corridors for dispersal by anthropogenic and animal routes (Trombulak and Frissell, 2000).

Access road and crossing maintenance, as well as general access road use, have the potential to result in soil or water contamination. Contaminated soil or water that enters wetlands can affect both the quantity and function of wetlands. Soil and water contamination can occur from the introduction of oils, gasoline, grease and other materials from construction equipment, other vehicles and materials storage and handling. Enrichment of wetlands with nitrogen can lead to changes in plant species composition (Wetzel and Valk, 1998). Bogs and fens, which are low nutrient wetlands, are the most sensitive to the addition of nitrogen, which can result in the loss of suitable habitat for wetland plants that have specific microclimates and are adapted to low nutrient conditions (Moore, *et al.* 1989).

Mitigation measures are proposed in **Section 6.3** to avoid or minimize potential effects on vegetation and ecological communities.

6.2.5 Surface Water

6.2.5.1 Construction and Decommissioning

Potential effects on surface water during construction and decommissioning of the HIWEC include:

- Changes in surface water quality; and
- Changes in surface water quantity.

Construction dewatering during access road water crossing installation has the potential to change surface water quantity. Where dewatering occurs, water levels of waterbodies may be temporarily lowered during construction. Dewatering during WTG and staging area construction may also alter surface water drainage patterns.

Changes to surface water quality could occur wherever erosion is possible. Erosion of soils into nearby waterbodies and watercourses could occur as a result of dewatering discharge, installation of water crossings, and equipment use. Site preparation activities near waterbodies such as vegetation clearing, soil grading, and blasting may result in unstable soils that are susceptible to erosion (DFO, 2010a). Blasting of bedrock that may be required to support construction of the HIWEC has the potential to release high velocity particles, dust and blast residues, and may change surface water quality through sedimentation (DFO, 2014).

In addition to changes in levels of suspended sediment, contamination of surface water could occur through accidental spills from vehicle and machinery operation near waterbodies and watercourses. Other activities potentially resulting in contaminant releases to surface water include equipment washing (e.g., concrete trucks).

Changes to surface water quantity during construction resulting from grading, blasting and rock removal, placement of fill, and temporary stockpiling at or near waterbodies and watercourses have the potential to change surface water drainage patterns. Overland surface water flow direction and volume may change as a result of loss of vegetation, changes in surficial topography, and changes in surficial soils.

Mitigation measures are proposed in **Section 6.3** to avoid or minimize potential effects on surface water.

6.2.5.2 Operations

During the operations phase of the project, maintenance vehicles travelling along access roads have the potential to change surface water quality through minor contaminant spills and air and dust emissions.

During the operations phase of the HIWEC, a change in surface water quantity is not anticipated.

Mitigation measures are proposed in **Section 6.3** to avoid or minimize potential effects on surface water.

6.2.6 Fish and Fish Habitat

6.2.6.1 Construction and Decommissioning

Potential effects on fish and fish habitat during construction and decommissioning of the HIWEC include:

- Changes in fish habitat (including other aquatic biota habitat such as invertebrates); and
- Changes in fish mortality risk (including other aquatic biota such as invertebrates).

Fish habitat, includes spawning grounds or any other areas, including nursery, rearing, food supply and migration areas, on which fish depend directly or indirectly in order to carry out their life processes (Government of Canada, 1985). Potential effects to fish and fish habitat resulting from HIWEC activities during construction / decommissioning are primarily due to erosion and sedimentation. Disturbance to surficial soils associated with clearing and grubbing of riparian vegetation in close proximity to waterbodies results in an increased risk of erosion. Changes to suspended sediment concentrations caused by water runoff from disturbed waterbody banks and riparian areas can lower the productivity of aquatic systems and have detrimental effects to the health of fish (DFO, 2010a).

There is potential for alteration or permanent loss of available fish habitat at watercourse crossing locations within the permanent footprint of the structure (i.e., culverts), and on waterbody banks in proximity to structures. Additionally, removal of riparian vegetation reduces the amount of organic matter input to waterbodies, which in turn may reduce the amount of available food and shelter for aquatic species (DFO, 2010b).

Changes in fish habitat may result due to increased contaminants in surface water and on waterbody banks. Where vehicles and machinery operate within 30 m of a waterbody, there is potential for minor contaminant releases due to fuel and engine fluid leaks, accidental spills, and equipment washing (e.g., concrete trucks).

Changes in fish mortality risk may occur due to blasting and / or vibrations near waterbodies during the construction of the WTG foundations, access roads, and collection and transmission lines. Blasting and its resulting vibration have potential to cause harm to fish and eggs, due to release of high velocity particles, dust and blast residues (DFO, 2014).

A total of 58 water crossings are proposed as part of HIWEC (refer to **Table 6-2** and **Table 6-3** below). Of these 58 water crossings, only 30 crossings were assessed as significant waterbodies[4] and potential fish habitat. Of the 30 fish-bearing water crossings, only one (1) was assessed as “high sensitivity” with respect to fish and fish habitat values. Another was assessed as “moderate sensitivity” but would require substantial fill below the high-water mark to accommodate a structure other than a clear-span. As such, these two (2) watercourses will be crossed using a clear span structure (i.e., no in-water works are proposed) to avoid adverse effects on fish and fish habitat. For the remaining crossings, culverts will be installed to avoid or minimize adverse effects on fish and fish habitat.

Mitigation measures are proposed in **Section 6.3** to avoid or minimize potential effects on fish and fish habitat.

4. *A significant waterbody is defined as a waterbody that contained either direct or indirect fish habitat. Fish habitat, includes spawning grounds or any other areas, including nursery, rearing, food supply and migration areas, on which fish depend directly or indirectly in order to carry out their life processes.*

Table 6-2: Habitat Sensitivity / Fish Habitat Summary for Tributaries to the Henvey Inlet

Waterbody Site ID	UTM	Sensitivity[5]	Fish Habitat?	Species Present	Project Activity	Proposed Crossing Type
WB-A-M1-1	45.890005 -80.558281	Low	Direct	• Unknown	Access Road / Collection Line	Culvert
WB-A-M2-2	45.89105 -80.545561	Low	Direct	• Unknown	Access Road / Collection Line	Culvert
WB-A-M3-3	45.891004 -80.535435	Moderate	Direct	• Cyprinnids Observed	Access Road / Collection Line	Culvert
WB-N-M1-30	45.887421 -80.574664	Low	Direct	• Central Mudminnow Suspected	Access Road / Collection Line	Culvert
WB-N-M1-32	45.8868 -80.5671	Low	No	• N/A	Access Road / Collection Line	TBD[6]
WB-N-M1-33	45.887048 -80.565941	Low	No	• N/A	Access Road / Collection Line	Culvert
WB-N-M4-59	45.871675 -80.585377	Moderate	Direct	• Unknown	Access Road / Collection Line	Culvert
WB-N-M6-3	45.872683 -80.606981	Low	Indirect	• Finescale Dace • Northern Redbelly Dace • Fathead Minnow • Brook Stickleback • Brown Bullhead • Central Mudminnow	Access Road / Collection Line	Culvert
WB-N-M7-34	45.876949 -80.616639	Low	No	• N/A	Access Road / Collection Line	Culvert
WB-N-M9-35	45.883893 -80.63149	Low	No	• N/A	Access Road / Collection Line	Culvert

5. *Sensitivity is determined using the MTO Environmental Guide for Fish and Fish Habitat (2012). The following definitions provide a summary of the scales for qualifying the attributes in freshwater ecosystem:*
   - *Low: No use by fish, or species present are resilient to change and perturbation. No direct use by fish; habitat has the potential to support only single-use life-cycle functions. Non-specialized habitat or indirect/contributing habitat. Habitat/species is/are prevalent and are widely distributed in the province/territory or waterbody where the work is being undertaken. Thermal regime/physical characteristics unsuitable for fish species, or warmwater baitfish systems that are stable and resilient to change – typically ephemeral and some intermittent systems where habitat is non-specialized.*
   - *Moderate: Species present are moderately resilient to change and perturbation. Habitat has the potential to support multiple life-cycle functions. Habitat/species has/have moderate distribution confined to small areas in the province/territory or waterbody where the work is being taken place. Warmwater (more sensitive fish species) and coolwater systems; system is unstable, but resilient to change and perturbation. Intermittent systems with habitat that is specialized, or permanent warmwater systems and coldwater systems without specialized habitat.*
   - *High: Species present are highly sensitive to perturbations, temperature, etc. Important or specialized habitat that is essential to the survival of species or populations. Critical habitat for END/THR Schedule 1 SAR. Habitat for Schedule 1 Special Concern Species. Species/habitat is rare/limiting. Coldwater systems that cannot buffer temperature changes with specialized habitat.*
6. *This site was identified and mapped using aerial imagery, but field investigations revealed that no watercourse or waterbody is present at this location. WB-N-M1-32 is a low-lying, forested area with sporadic, seasonal pools of shallow standing water. The type of crossing structure will be determined during detailed design.*

Table 6-2: Habitat Sensitivity / Fish Habitat Summary for Tributaries to the Henvey Inlet

Waterbody Site ID	UTM	Sensitivity[5]	Fish Habitat?	Species Present	Project Activity	Proposed Crossing Type
WB-N-M12-12	45.869473 -80.617932	Low	Indirect	• Central Mudminnow • Northern Redbelly Dace • Finescale Dace • Brook Stickleback	Access Road / Collection Line	Culvert
WB-N-M12-12-2	45.869426 -80.617160	Moderate	Direct	• Unknown	Access Road / Collection Line	Culvert
WB-N-M12-37	45.870799 -80.623086	Low	No	• N/A	Access Road / Collection Line	Culvert
WB-N-M13-36	45.876749 -80.627036	Low	No	• N/A	Access Road / Collection Line	Culvert
WB-N-M14-38	45.8698 -80.6362	Low	No	• N/A	Access Road / Collection Line	Culvert
WB-N-M18-39	45.882888 -80.655294	Low	No	• N/A	Access Road / Collection Line	Culvert
WB-N-M18-39-2	45.884409 -80.650519	Low	Indirect	• Unknown	Access Road / Collection Line	Culvert
WB-N-M21-28	45.878739 -80.64723	Low	No	• N/A	Access Road / Collection Line	Culvert
WB-N-M23-40	45.880471 -80.664364	Low	No	• N/A	Access Road / Collection Line	Culvert
WB-N-M26-21	45.857530 -80.645220	Moderate	Direct	• Central Mudminnow • Northern Redbelly Dace • Brown Bullhead • Brook Stickleback • Finescale Dace • Iowa Darter • Golden Shiner • Fathead Minnow • Pumpkinseed • Yellow Perch	Access Road / Collection Line	Clear Span Structure
WB-N-M26-31	45.856181 -80.653020	Low	Direct	• Unknown	Access Road / Collection Line	Culvert
WB-N-M28-16	45.867458 -80.664366	Low	Direct	• Finescale Dace • Brook Stickleback • Fathead Minnow	Access Road / Collection Line	Culvert
WB-N-M31-2	45.8836 -80.6797	Low	No	• N/A	Access Road / Collection Line	Culvert

Table 6-2: Habitat Sensitivity / Fish Habitat Summary for Tributaries to the Henvey Inlet

Waterbody Site ID	UTM	Sensitivity[5]	Fish Habitat?	Species Present	Project Activity	Proposed Crossing Type
WB-N-M31-2-2	45.884278 -80.677818	Low	Indirect	• Cyprinnids observed	Access Road / Collection Line	Culvert
WB-N-M32-14	45.855529 -80.656595	Moderate	Direct	• Central Mudminnow • Fathead Minnow • Iowa Darter • Brook Stickleback • Yellow Perch	Access Road / Collection Line	Culvert
WB-N-M32-26	45.855091 -80.660446	Low	No	• N/A	Access Road / Collection Line	Culvert
WB-N-M34-42	45.863408 -80.670603	Low	No	• N/A	Access Road / Collection Line	Culvert
WB-N-M35-1	45.858495 -80.680394	Low	Direct	• Black Crappie • Yellow Perch • Central Mudminnow • Pumpkinseed	Access Road / Collection Line	Culvert
WB-N-M37-15	45.863522 -80.684139	Low	Indirect	• Unknown	Access Road / Collection Line	Culvert
WB-N-M39-19	45.873391 -80.694416	Low	No	• N/A	Access Road / Collection Line	Culvert
WB-N-M41-43	45.857081 -80.6916	Low	No	• N/A	Access Road / Collection Line	Culvert
WB-N-M41-44	45.854384 -80.691642	Low	Indirect	• Unknown	Access Road / Collection Line	Culvert
WB-N-M43-22	45.860319 -80.69073	Low	No	• N/A	Access Road / Collection Line	Culvert
WB-N-M46-4	45.858124 -80.698575	Low	Direct	•	Access Road / Collection Line	Culvert
WB-N-M47-45	45.8628 -80.7015	Low	No	• N/A	Access Road / Collection Line	Culvert
WB-N-M49-46	45.872101 -80.713246	Low	Direct	• Unknown	Access Road / Collection Line	Culvert
WB-S-M1-58	45.870836 -80.629743	Low	No	• N/A	Access Road / Collection Line	Culvert

Table 6-2: Habitat Sensitivity / Fish Habitat Summary for Tributaries to the Henvey Inlet

Waterbody Site ID	UTM	Sensitivity[5]	Fish Habitat?	Species Present	Project Activity	Proposed Crossing Type
WB-S-M13-13	45.843404 -80.629743	Moderate	Direct	• Brown Bullhead • Northern Redbelly Dace • Iowa Darter • Brook Stickleback • Finescale Dace • Golden Shiner • Central Mudminnow	Access Road / Collection Line	Culvert
WB-S-M30-11	45.839789 -80.648154	Low	Direct	• Central Mudminnow	Access Road / Collection Line	Culvert
WB-S-M36-50	45.824954 -80.662797	Low	No	• N/A	Access Road / Collection Line	Culvert
WB-S-M47-18	45.8254 -80.6972	Low	No	• N/A	Access Road / Collection Line	Culvert
WB-S-M48-17	45.82841 -80.698612	Low	No	• N/A	Access Road / Collection Line	Culvert
WB-S-M49-9	45.830650 -80.710836	Low	No	• N/A	Access Road / Collection Line	Culvert
WB-S-M49-48	45.83022 -80.70568	Low	No	• N/A	Access Road / Collection Line	Culvert
WB-S-M50-10	45.826297 -80.708567	Moderate	Direct	• Central Mudminnow • Brown Bullhead • Brook Stickleback • Golden Shiner • Finescale Dace	Access Road / Collection Line	Culvert
WB-S-M52-58	45.862586 -80.582949	Low	Direct	• Unknown	Access Road / Collection Line	Culvert

Table 6-3: Habitat Sensitivity / Fish Habitat Summary for Tributaries to the Sandy / Byng Inlet

Waterbody Site ID	UTM	Sensitivity	Fish Habitat?	Species Present	Project Activity	Proposed Crossing Type
WB-S-M5-7	45.846711 -80.585728	Low	Indirect	• Unknown	Access Road / Collection Line	Culvert
WB-S-M8-56	45.8485 -80.6092	Low	No	• N/A	Access Road / Collection Line	Culvert
WB-S-M8-57	45.848626 -80.608959	Low	Indirect	• Central Mudminnow • Northern Redbelly Dace • Finescale Dace	Access Road / Collection Line	Culvert
WB-S-M13-55	45.846436 -80.627701	Low	No	• N/A	Access Road / Collection Line	Culvert
WB-S-M17-29	45.832743 -80.638377	Moderate	Direct	• Creek Chub • Northern Redbelly Dace • Central Mudminnow • Brook Stickleback • Iowa Darter • Blackchin Shiner • Pumpkinseed • Blacknose Shiner • Bluntnose Minnow • Johnny Darter • Rock Bass	Access Road / Collection Line	Culvert
WB-S-M19-6	45.833812 -80.623393	Moderate	Direct	• Creek Chub • Northern Redbelly Dace • Central Mudminnow • Brook Stickleback	Access Road / Collection Line	Culvert
WB-S-M34-53	45.830138 -80.650875	Low	Direct	• Central Mudminnow • Finescale Dace	Access Road / Collection Line	Culvert
WB-S-M34-54	45.828543 -80.645114	Low	No	• N/A	Access Road / Collection Line	Culvert
WB-S-M36-49	45.8235 -80.6663	Low	No	• N/A	Access Road / Collection Line	Culvert

Table 6-3: Habitat Sensitivity / Fish Habitat Summary for Tributaries to the Sandy / Byng Inlet

Waterbody Site ID	UTM	Sensitivity	Fish Habitat?	Species Present	Project Activity	Proposed Crossing Type
WB-S-M39-8	45.818558 -80.667289	High[7]	Direct	• Creek Chub • Finescale Dace • Central Mudminnow • Brook Stickleback • Northern Redbelly Dace • White Sucker • Iowa Darter • Common Shiner • Fathead Minnow • Brassy Minnow • Blacknose Shiner • Johnny Darter	Access Road / Collection Line	Clear Span Structure
WB-S-M39-51	45.817147 -80.663979	Low	No	• N/A	Access Road / Collection Line	Culvert
WB-S-M41-52	45.821874 -80.648901	Low	Direct	• Central Mudminnow • Finescale Dace • Brown Bullhead • Brook Stickleback • Golden Shine	Access Road / Collection Line	Culvert

7. *Defined as "High Sensitivity" due to the fish and fish habitat values.*

6.2.6.2 Operations

General operations activities such as the accidental release of contaminants from vehicles and machinery have the potential to change fish and fish habitat.

Buildup of debris at access road water crossings (e.g., culverts) can cause flooding and may change local drainage patterns.

During the operations phase of the HIWEC, a change in fish mortality is not anticipated.

Mitigation measures are proposed in **Section 6.3** to avoid or minimize potential effects on fish and fish habitat.

6.2.7 Species at Risk

6.2.7.1 Construction and Decommissioning

Potential effects on SAR (including Canada Warbler, Common Nighthawk, Kirtland's Warbler, Olive-sided Flycatcher, Whip-poor-will, Blanding's Turtle, Eastern Musk Turtle, Eastern Foxsnake, Eastern Hog-nosed Snake, Massasauga Rattlesnake, Little Brown Bat, Northern Myotis and Tri-colored Bat) during construction and decommissioning of the HIWEC include:

- Habitat change (including possible damage, destruction and / or fragmentation of SAR residences or SAR habitat);
- Change in mortality risk (including harm, harassment and /or killing of SAR); and
- Change in behaviour, due to disturbance of SAR.

These potential effects are discussed generally under the Wildlife and Wildlife Habitat VEC above. Additional details specific to SAR are described in the subsections that follow.

6.2.7.1.1 Habitat Change

Bird Species at Risk

Vegetation clearing for site preparation and construction of the HIWEC has the potential to affect habitat availability and quality for SAR birds, both through direct loss of habitat within the construction footprint and fragmentation of the remaining habitat within the HIWEC study area. The bird SAR present within the HIWEC study area, include Canada Warbler, Common Nighthawk, Olive-sided Flycatcher, Whip-poor-will and Kirtland's Warbler. Suitable habitats for these bird SAR are described in **Section 4.1.5.1** and are shown on **Figure 6-1a to 6-1o** (**Appendix O**). Total areas of suitable habitat loss within the construction footprint based on the 120 turbine layout are provided for each bird SAR in hectares and are compared to the total area of suitable habitat available in the HIWEC study area in percentages as follows:

Bird SAR	Loss of Suitable Habitat in the HIWEC Study Area (ha)
	120 Turbine Layout
Canada Warbler	31.6 (1.7%)
Common Nighthawk	141.7 (2.4%)
Olive-sided Flycatcher	9.3 (0.7%)
Eastern Whip-poor-will	172.8 (2.3%)
Kirtland's Warbler	116.9 (3.0%)

These calculations of total habitat loss for each bird SAR are conservative estimates since is it unlikely that all of the identified suitable habitats are occupied by individuals of each respective species to the full extent that is mapped on **Figures 6-1a** to **6-1o** (**Appendix O**). It is important to note that ultimately 91 WTGs will be built; therefore, the reduction in the number of WTGs in combination with the mitigation measures proposed in **Section 6.3** will further minimize the total area of habitat loss presented above for each bird SAR.

Canada Warbler, Common Nighthawk, Olive-sided Flycatcher and Whip-poor-will have been shown to use forest habitats altered by human-made openings, if these open areas are left to regenerate after human disturbance (COSEWIC, 2007b; COSEWIC, 2008c; COSEWIC, 2008d; COSEWIC, 2009). Suitable habitat for all of these species is extensive throughout the HIWEC study area and therefore alternative breeding sites will be available during the construction phase when vegetation will be initially cleared.
Kirtland's Warblers exclusively depend on early successional Jack Pine forest stands larger than 30 ha in size, and have been noted to experience higher breeding success in habitat patches that exceed 200 ha in size (Mayfield, 1992; COSEWIC, 2008a). Given the average territory size occupied by breeding pair of Kirtland's Warbler is approximately 15 ha (EC, 2006) and that the HIWEC study area provides extensive suitable habitat that could be used as alternative breeding sites for this species, of which up to 3.0% will be removed, some localized disturbance associated with vegetation clearing for site preparation, development of access roads and WTG construction footprints may occur; however, this would be considered temporary as vegetation clearing during construction is a one-time event.

The majority of the HIWEC study area is dominated by a natural mosaic of rock barren, forest and wetland communities that are not large contiguous units but are instead interspersed with each other. Considering this degree of interspersion and the overall availability of rock barren habitat, the addition of gravel roads that will be traveled during construction is not anticipated to have an effect with respect to fragmentation on interior habitat due to:

- The layout of the proposed access road does not directly bisect large contiguous forest communities,
- The application of the proposed access road will consist of crushed rock from the site, which is not a significant change from the overall rock barren landscape, and
- The total average width of the access road will be 15m, which is not considered a significant barrier for wildlife movement (MNRF, 2000*).*

Turtle Species at Risk

Development activities for the HIWEC including site preparation and construction of access roads, WTGs and laydown areas, have the potential to result in a loss, degradation, and fragmentation of habitat for turtle SAR. The turtle SAR present in the HIWEC study area include Blanding's Turtle and Eastern Musk Turtle. Suitable habitats for both turtle SAR are shown on **Figures 6-2a** to **6-2o** (**Appendix O**). Total areas of suitable habitat loss within the construction footprint based on the 120 turbine layout are provided for each turtle SAR in hectares and are compared to the total area of suitable habitat available in the HIWEC study area in percentages as follows:

Turtle SAR	Total Loss of Suitable Habitat in the HIWEC Study Area (ha)
	120 Turbine Layout
Blanding's Turtle	157.9 (2.3%)
Eastern Musk Turtle	24.6 (1.0%)

This calculation is a conservative estimate since it is unlikely that all of the identified suitable habitats are actually used by turtle SAR to the full extent that is mapped on **Figures 6-2a to 6-2o** (**Appendix O**) based on field observations from 2011 to 2015. It is important to note that ultimately 91 WTGs will be built; therefore, the reduction in the number of WTG in combination with the mitigation measures proposed in **Section 6.3** will further minimize the total area of habitat loss presented above for each turtle SAR.

Blanding's Turtles utilize a variety of wetland habitats including but not limited to lakes, ponds, creeks, rivers, man-made channels, marshes, marshy meadows, and coastal areas; however the preferred habitats are characterized by shallow water with an organic substrate and high density of aquatic vegetation (COSEWIC, 2005). The Eastern Musk Turtle inhabits littoral zones and shallow waterways (Ford and Moll, 2004) with slow current and soft bottom substrates (COSEWIC, 2002; Petokas and Gawlik 1982; Conant and Collins, 1998; Belleau, 2008). The preferred habitat for this species includes shallow water with abundant floating and submerged vegetation (COSEWIC, 2002; Carrière, 2007; Belleau, 2008; Laverty, 2010; Picard *et al*. 2011).

These types of habitats were generally avoided in the design of access roads, WTGs and laydown areas; however, minor overlaps between construction footprint and suitable habitat occur throughout the HIWEC. Similar to bird SAR, this type of habitat is also extensive throughout the HIWEC study area. Construction activities including but not limited to vegetation clearing in wetlands in or within close proximity to waterbodies could result in loss of turtle SAR habitat. There is a total of 2445 ha of wetland available within the HIWEC study area. Up to 24.5 ha (1% of wetland within the HIWEC study area) of wetland will be removed during construction. This wetland habitat loss will include up to 8.0 ha of swamp (0.3% of wetlands available within the HIWEC), 2.8 ha of fen (0.1% of wetlands available within the HIWEC), 2.6 ha of bog (0.1% of wetlands available within the HIWEC) and 1.1 ha of marsh (0.04% of wetlands available within the HIWEC). Of the different wetland types found within the HIWEC study area the Blanding's Turtle are most likely to use the marsh and fen wetland types. Marsh wetlands occupy 787.3 ha or 32.2% of wetlands available within the study area. The construction of the HIWEC would result in the removal of 1.1 ha of marsh (0.1% of marsh available within the study area). Fen type wetlands occupy 715.2 ha or 29.3% of all wetlands within the HIWEC study area. The construction of the HIWEC would result in the removal of 2.8 ha of fen (0.4% of the fen wetland type within the HIWEC study area). Where suitable habitat for Blanding`s turtle would be affected, it would usually be localized to wetland edges or overlap with a small portion of a greater wetland polygon, which would continue to provide habitat functionality for turtle SAR located within proximity to the affected area.

The Eastern Musk turtle requires specialized habitat and generally prefers shallow water (<2m) with an abundance of floating and submerged vegetation (COSEWIC, 2012b). This species is most likely to utilize the marsh wetland types although may also occur in open water pockets of fens. These wetland types encompass 3.9 ha of the wetlands that will be lost due to the construction of the HIWEC (0.4% of the fen wetland types, and 0.1% of marsh wetland types available within the HIWEC study area). Where suitable habitat for Musk Turtle would be affected, it would usually be localized to wetland edges or overlap / fragment with a small portion of a greater wetland polygon, which would continue to provide habitat functionality for turtle SAR located within proximity to the affected area.

Snake Species at Risk

Construction activities, including but not limited to site preparation (blasting and vegetation clearing), construction of access roads, WTGs and laydown areas within rock barrens, peatlands, forested habitats and areas in close proximity to the shoreline have the potential to affect habitat availability and quality for snake SAR within the HIWEC study area. Snake SAR include, Massasauga Rattlesnake, Eastern Foxsnake and Eastern Hog-nosed snake. Of the three snake species, Massasauga Rattlesnake was the most frequently recorded and was observed throughout the HIWEC study area during baseline studies completed between 2011 and 2015. Suitable habitat for all three snake SAR are described as follows;

Massasauga Rattlesnake - Massasauga Rattlesnake observed within HIWEC study area are considered part of the Eastern Georgian Bay Population (Parks Canada Agency, 2015) and have three essential habitat requirements: gestation, hibernation and foraging (Johnson, *et al*. 2000), which encompass a wide variety of communities including wet prairie and old fields to peatlands, rock barrens, and coniferous forests (COSEWIC, 2013a). Gestation sites are found in areas of large, flat table rocks or rock piles that can be found in forest openings or area of bedrock outcropping (EMRT, 2005). The Eastern Georgian Bay Population generally hibernate in areas where soils are saturated with water but contain sparse trees and shrubs and an abundance of sphagnum. Within the

HIWEC study area, hibernation sites are considered within the fen, bog and swamp wetland types. These wetland types comprise 1657.3 ha or 67.8% of the wetlands available within the HIWEC study area.

Eastern Foxsnake - The Georgian Bay Coast population of Eastern Foxsnake utilize open habitats within 1 km of shorelines and much of their activity is concentrated within 150 m of the water (COSEWIC 2008b).

Eastern Hog-nosed snake - Eastern Hog-nosed Snake utilized open woods, brushlands and / or forest edge with loose or sandy soil (COSEWIC, 2007b).

Suitable reptile hibernacula, gestation and nesting sites for all snake SAR was identified during the baseline surveys completed within the construction footprint in 2015 are shown on Figure **6-3a** to **6-3o** (**Appendix O**). As per Section 4.1.5.1.1.13, critical habitat of Massasauga Rattlesnake was mapped by Natural Resources Solutions Inc. (NRSI) as suitable habitat within 1.2 km radius buffer around occurrence records (**Figure 6-4; Appendix O**). Total areas of suitable habitat for all snake SAR observed and critical habitat loss for Massasauga Rattlesnake within the construction footprint based on the 120 turbine layout are provided in hectares and are compared to the total area of suitable/critical habitat available in the HIWEC study area in percentages as follows:

Snake SAR	Total Loss of Suitable/Critical Habitat in the HIWEC Study Area (ha)
	120 Turbine Layout
Eastern Foxsnake	90.2 (1.0%), including 10 reptile hibernacula sites
Massasauga Rattlesnake suitable habitat	189.1 (2.2%), including 30 gestation and five (5) hibernacula sites
Massasauga Rattlesnake critical habitat	174.1 (2.3%)
Eastern Hog-nosed Snake	171.1 (3.9%)

These calculations of total suitable/critical habitat loss are conservative estimates. Specifically, the area calculation for suitable habitat of Massasauga Rattlesnake assumes suitable gestation and hibernacula sites could be found throughout the entirety of the HIWEC study area except where open water is present. Similarly, the calculation for Eastern Foxsnake assumes that all wetland and rock barren areas within 1 km of Georgian Bay, Henvey Inlet and Key River are suitable habitat. The area calculations for Eastern Hog-nosed Snake assume that all wetlands, rock barrens, mixed forests, cultural meadows and cultural woodlands are suitable habitat within the HIWEC study area. Two (2) sand barren features (**Figures 6-3i and 6-3k; Appendix O**) were also identified as suitable nesting habitat for Eastern Hog-nosed snake as this species lays eggs in sandy soil (COSEWIC, 2007b).

With respect to hibernation habitat for Massasauga Rattlesnake, the construction of the HIWEC will result in the loss of up to 8 ha of swamp (0.9% of the available swamp type wetlands in the HIWEC study area), 2.8 ha of fen (0.4% of available fen types wetlands within the study area), and 2.6 ha of bog (0.3% of the available bog type wetlands within the study area. This could result in the loss of up to 13.4 ha or 0.8% of the potentially suitable wetlands for Massasauga Rattlesnake hibernation. Where suitable habitat for Massasuaga Rattlesnake would be affected, it would usually be localized to wetland edges or overlap with a small portion of a greater wetland polygon, which would continue to provide habitat functionality for snake SAR located within proximity to the affected area.

Furthermore, suitable and unoccupied habitat elsewhere in the HIWEC study area will be available for displaced snake SAR individuals, if any. According to Edge *et al*. (2010), preferred or high-quality habitat in large and relatively pristine areas, such as in the HIWEC study area may not be a limiting resource given the homogeneity of the landscape in terms of meeting habitat requirements of resident species. Availability of suitable habitat for snakes in the HIWEC study area can be extrapolated from the snake basking surveys completed in 2015. Snake basking surveys were completed at suitable gestation and hibernacula sites at 24 stations overlapped by the proposed HIWEC location in the spring / summer of 2015. Massausaga Rattlesnakes were observed at three (3) of the 24 stations. Suitable snake gestation and hibernacula are therefore not expected to be a limiting resource in the HIWEC study area since snakes occupied only 12.5 % of suitable gestation and hibernaculum sites surveyed.

Given that Massasauga Rattlesnake have a home range of 1 to 135 ha and are known to hibernate / gestate within 40 to 100 m of previous year locations (COSEWIC, 2013a), displaced individuals are anticipated to readily find alternative and unoccupied sites suitable for gestation or hibernation elsewhere. Therefore, loss of a particular gestation site or hibernation site should not have detrimental effects on an individual of the species since suitable gestation and hibernation habitat is found throughout the HIWEC study area.

It is important to note that ultimately 91 WTGs will be built; therefore, the reduction in the number of WTGs in combination with the mitigation measures proposed in **Section 6.3** will further minimize fragmentation and the total area of suitable/critical habitat loss presented above for each snake SAR. For example, micrositing HIWEC infrastructure away from the sand barren features will result in no loss of nesting habitat for Eastern Hog-nosed Snake. In addition, suitable habitat for Eastern Foxsnake is located within 1 km of Georgian Bay, and the HIWEC has been designed to avoid the placement of infrastructure in close proximity to (i.e. within 500 m of) Georgian Bay, thereby minimizing habitat loss for this species.

Bat Species at Risk

The bat SAR observed within the HIWEC study area, including Little Brown Bat, Northern Myotis and Tri-colored Bat, form maternity colonies where females give birth and raise pups in the cavities of large (typically > 25 cm diameter-at-breast-height) trees that are generally in the middle stages of decay and located in open areas within mature forests (COSEWIC, 2013b). The removal of suitable cavity trees during vegetation clearing for construction of the HIWEC could result in a reduction of suitable maternity colony or roosting habitat for these species. However, portions of the HIWEC study area are forested while the surrounding region is heavily forested; therefore, cavity trees suitable for maternity colonies within HIWEC are likely not limiting to local bat populations (MNRF, personal communication, June 25, 2015).

Suitable maternity colony habitats for all three (3) bat SAR are shown on **Figures 6-4a to 6-4o (Appendix O)**. Total areas of suitable habitat loss within the construction footprint based on the 120 turbine layout are provided for each bat SAR in hectares and are compared to the total area of suitable habitat available in the HIWEC study area in percentages as follows:

Bat SAR	Loss of Suitable Habitat in the HIWEC Study Area (ha)
	120 Turbine Layout
Little Brown Bat	189.1 (2.2%)
Northern Myotis	
Tri-coloured Bat	

These calculations are conservative estimates since it is unlikely that all of the identified suitable habitat is actually used by bat SAR to complete their critical life processes to the full extent that is mapped on **Figures 6-5a** to **6-5o**. It is important to note that ultimately 91 turbines will be built; therefore, this in combination with the mitigation measures proposed in **Section 6.3** will further minimize the total area of habitat loss presented above for each bat SAR.

The mitigation measures proposed in **Section 6.3** will further minimize the total area of bat SAR habitat loss. Furthermore, installation of a minimum of 10 artificial roosting structures within the HIWEC study area will compensate for the habitat loss for bat SAR. Given that bat SAR often forage in small open areas adjacent to woodlands, the HIWEC is not anticipated to result in any habitat fragmentation effects on these species.

Mitigation measures are proposed in **Section 6.3** to avoid or minimize all potential effects.

6.2.7.1.2 Change in Mortality Risk

Bird Species at Risk

HIWEC construction activities, particularly vegetation removal, may increase the risk of mortality to bird SAR recorded in the HIWEC study area including Canada Warbler, Common Nighthawk, Kirtland's Warbler, Olive-sided Flycatcher and Whip-poor-will. Canada Warblers nest in wet forested areas, often in dense ferns or fallen logs (COSEWIC, 2008c). Common Nighthawks lay their eggs directly on soil, sand, gravel, or bare rock (COSEWIC, 2007b). Kirtland's Warblers nest on the ground within young Jack Pine forests (COSEWIC, 2008a). Olive-sided Flycatchers in Ontario generally nest in coniferous trees such as White Spruce, Black Spruce, Jack Pine and Balsam Fir (COSEWIC, 2008d). Whip-poor-wills prefer to nest in semi-open forests with clearings such as barrens or regenerating forests (COSEWIC, 2009). Disturbance to nest sites for these species during construction of the HIWEC, including through vegetation clearing, excavation or blasting, could result in the mortality of adult and juvenile bird SAR and nest failure, if suitable habitat is present within the blasting zone or the area of vegetation to be cleared.

Mitigation measures, proposed in **Section 6.3,** will avoid mortality of bird SAR; this includes, but is not limited to, minimizing vegetation removal and limiting its extent to the construction footprint through micrositing, scheduling removal of vegetation and blasting outside the bird nesting season, conducting nest surveys prior to vegetation removal if necessary and applying species-specific buffers around active nest or confirmed nesting activity.

Turtle Species at Risk

HIWEC construction activities, particularly vegetation removal may increase the risk of mortality to SAR turtles recorded in the study area including Blanding's Turtle and Eastern Musk Turtle. Blanding's Turtles nest in loose sand or organic soil in June; the hatchlings emerge in late September to early October (COSEWIC, 2005). Blanding's Turtles may exhibit some tolerance to disturbance as they have been observed nesting in disturbed areas including roadways. Eastern Musk Turtles in Canada have an active season of April to October (Belleau, 2008; Millar, 2008; Picard, *et al*. 2011). Eggs are laid in June and July and hatchlings emerge in August and September (COSEWIC, 2012a). Overwintering Blanding's Turtle require between 7 and 50 cm of ice-free water to avoid the threat of freezing provided by ponds and limited locations within habitats such as marshes, bogs and fens (Edge, et al. 2009). Eastern Musk Turtles are unable to tolerate anoxic conditions to the same extent as other turtles (Ultsch and Cochran, 1994); for this reason, this species typically overwinters in lakes and rivers (Ultsch, 2006; Ultsch and Reese, 2008). Blanding's Turtle may exhibit fidelity to overwintering sites and both Blanding's Turtle and Eastern Musk Turtles may overwinter in groups, which make these species very sensitive to potential disturbances to hibernacula during the overwintering period. Overwintering sites for Blanding's Turtle hatchlings is unknown but it is suggested that hatchlings may overwinter on land provided that habitat conditions remain moist enough during hibernation; however, no such instances of hatchlings hibernating terrestrially have been reported and it's not considered to be typical behaviour (COSEWIC, 2005).

The HIWEC has been sited to avoid as much wetland area as possible and therefore mortality of turtle SAR as a result of disturbance to hibernation sites during the overwintering period is not expected. Nevertheless, turtle SAR that may travel long distances between wetlands, nesting sites and overwintering areas, will likely be at an increased risk of mortality during site preparation, construction/decommissioning and during the transportation of equipment. Furthermore, possible disturbance to nesting sites during the nesting period (i.e., possible disturbance to nesting sites that could be present in new stockpile areas) have the potential to result in the destruction of nests and therefore a reduction in turtle SAR breeding success. Mitigation measures proposed in **Section 6.3** will avoid mortality of turtle SAR.

According to the Ontario Road Ecology Group (2010), slow-moving animals such as reptiles, are particularly susceptible to road mortality. Although direct mortality due to vehicle use on access roads is a potential effect to

Blanding's Turtle, this species has been found to avoid crossing roads (Proulx et al. 2014). An individual turtle's likelihood of crossing roads was not influenced by the material of the road surface (Proulx et al. 2014). Based on the potential avoidance preference of Blanding's Turtle to crossing both paved and unpaved roads, this species is expected to be encountered less frequently along access roads. This possibility, combined with very low vehicle traffic along access roads is expected to result in minimal interactions between this species and vehicular traffic. Given that Eastern Musk Turtle is a highly aquatic species and rarely leaves the water except when nesting (COSEWIC, 2012a), this species is unlikely to be encountered outside its typical wetland and open water habitats. Mitigation measures proposed in **Section 6.3** will avoid road mortality of turtle SAR.

Approximately 20% of the global range of Blanding's Turtle occurs in Canada, of which is concentrated in southern and south-central Ontario (COSEWIC, 2005). The maximum population size of the Great Lakes/St. Lawrence population of Blanding's Turtle is estimated at 10,000 adults in Ontario and Quebec (COSEWIC, 2005). Similarly, Eastern Musk Turtle population in Ontario and Quebec is also estimated to be 10,000 adults, representing 5% of its global range (COSEWIC, 2012a). Based on the Ontario Reptile and Amphibian Atlas (Ontario Nature, 2015), Blanding's Turtle sightings are concentrated along the Georgian Bay shoreline within the Parry Sound District, including within the HIWEC study area. There are also numerous recent sightings inland within the Parry Sound District as well as in other adjacent counties such as Muskoka District Municipality and Haliburton County. Observations of Eastern Musk Turtle are limited in the Parry Sound District to a small number of recorded locations south of the HIWEC study area (Ontario Nature, 2015). Although both species occur elsewhere and outside of the HIWEC study area, they are susceptible to increased mortality risk associated with HIWEC construction activities and possible population level effects may occur considering their small populations and life-history strategies (i.e., delayed sexual maturity, long lifespan, low recruitment and reliance on low adult mortality; COSEWIC 2005; COSEWIC, 2012a), if left unmitigated.

Snake Species at Risk

HIWEC construction activities, particularly blasting , vegetation removal and vehicle use along access roads, may increase the risk of mortality to snake SAR. The snake SAR present in the HIWEC study area include Massasauga Rattlesnake, Eastern Foxsnake and Eastern Hog-nosed Snake. Massasauga Rattlesnakes exhibit an active period from approximately May to October in Ontario (COSEWIC, 2013a; Rouse, *et al*. 2001). This species is documented to emerge from hibernacula when ground temperatures meet or exceed 10°C (Pratt, *et al*. 2000). This species mates in the late summer, after which the female stores sperm until ovulation the following spring (COSEWIC, 2012b). Massasauga Rattlesnakes exhibit approximately three (3) months of gestation prior to giving birth (COSEWIC, 2012b). There is some evidence that Massasauga Rattlesnakes can tolerate some disturbance as they actively use disturbed areas for gestation and refuge including gestation sites adjacent to trails, abandoned boats, abandoned docks and debris piles (COSEWIC, 2012b).

Eastern Foxsnakes exhibit an active period from approximately May to October; they emerge from hibernacula in April or May, eggs are laid in late June to mid-July, and snakes return to hibernacula in September and October (COSEWIC, 2008b). Eggs have been documented to incubate for a period of 50 to 65 days and hatchlings emerging between late August and mid-October (COSEWIC, 2008b; Harding, 1997). There is some evidence that Eastern Foxsnakes can tolerate some anthropogenic disturbance as they have been documented to use human-made structures for hibernation, oviposition, and shelter (COSEWIC, 2008b).

Eastern Hog-nosed Snakes exhibit an active period from approximately April to October (COSEWIC, 2007b). This species lays eggs for a two (2) to three (3) week period starting in late June (Cunnington and Cebek, 2005; COSEWIC, 2007b). Eggs incubate for an average of 58 days with hatchings emerging in late August and early September (COSEWIC, 2007b; Cunnington and Cebek, 2005). Eastern Hog-nosed Snakes appear intolerant of anthropogenic disturbance as the species is documented to experience higher mortality rates in or near urban areas (COSEWIC, 2007b). Snake SAR in the HIWEC study area may be vulnerable to increased mortality risk

during the gestation, nesting and hibernation periods. Therefore, occasional encounters during the active season, and possible disturbance to gestations sites and nesting sites during the spring or hibernacula during the hibernation period could result in the mortality of snake SAR.

Access road use during construction of the HIWEC may increase mortality risk to snake SAR through accidental vehicular collisions. Massasauga have been shown to exhibit some road avoidance behaviour, which may reduce the risk of road mortality for this species (Parent and Weatherhead 2000, Andrews and Gibbons 2005, Eads 2013). Eastern Foxsnake activity is concentrated within 150 m of large waterbodies (COSEWIC 2008b). Given that the HIWEC has been designed to avoid the placement of infrastructure in close proximity to (i.e. within 500 m of) Georgian Bay, this species also has reduced risk of road mortality as it's not expected to be frequently encountered along access roads. Eastern Hog-nosed Snake was not observed during the 2011 to 2015 baseline studies; however, it is possible that this species exists within the HIWEC study area, in small numbers, due to its elusive nature. Since there are suitable habitats for this species in the HIWEC study area, this may contribute to its potential of increased mortality risk. Mitigation measures proposed in **Section 6.3** will avoid road mortality of snake SAR during construction.

Persecution by people of these snake SAR may also cause increased mortality as result of fear. Massasauga Rattlesnake is especially vulnerable to persecution because it is the only venomous snake in Ontario and this may have caused elevated levels of fear contributing to general negative public opinion (COSEWIC, 2012). However, Massausaga Rattlensake poses relatively little threat or harm to public safety (COSEWIC, 2012). With the implementation of appropriate mitigation measures as described in **Section 6.3**, the risk of persecution will be minimized.

Ontario contains the entire Canadian population of Massasauga Rattlesnake estimated to consist of 1,600 adults, which represents 10% of the global population (COSEWIC 2012b). Massasauga Rattlesnake in the Great Lakes/St. Lawrence zone is considered stable relative to Carolinian zone from which the species has been nearly extirpated except for a few subpopulations (COSEWIC, 2012b). Similarly, the Canadian Eastern Hog-nosed Snake population consists of less than 7,500 adults and is limited to Ontario (COSEWIC, 2007c).

Currently, there are no reliable estimates of Canadian population sizes for Eastern Foxsnake, of which 70% of its range is in Ontario (COSEWIC, 2008b). These snake SAR have been observed along the length of Georgian Bay coast shoreline throughout the Parry Sound District, including within and outside of the HIWEC study area, as well as several other counties such as Muskoka District Municipality (Ontario Nature, 2015).

Bat Species at Risk

HIWEC construction activities may increase the risk of mortality to bat SAR recorded in the HIWEC study area including Little Brown Bat, Northern Myotis and Tri-colored Bat, particularly if vegetation removal includes cavity trees which contain active maternity roosts. Little Brown Bats roost in warm sites including buildings, under bridges, in rock crevices, or in cavities trees (COSEWIC, 2013b). Northern Myotis roost in large diameter (25 to 44 cm DBH) trees (COSEWIC, 2013b). In general, both the Little Brown Bat and the Northern Myotis roost in open areas of mature forest within tall, large diameter snags that are in early to moderate stages of decays (Jung, *et al.* 2004). Tri-coloured Bats are known to roost in buildings, in dead leaves on trees or within arboreal lichens in trees; furthermore, the species also shows tree fidelity (Veilleux and Veilleux, 2004). Tri-coloured Bats can roost in a variety of tree species including oaks, pines and spruces (Perry and Thill, 2007; Poissant, *et al*. 2010). Disturbance to active roost sites, including maternity colonies, of these species during construction of the HIWEC through vegetation clearing could result in the mortality of bat SAR, if active maternity roosts are present within the area of vegetation to be cleared.

Mitigation measures are proposed in **Section 6.3** to avoid or minimize all potential effects.

6.2.7.1.3 Change in Behaviour

Bird Species at Risk

HIWEC construction activities, such as blasting and / or vegetation removal, through disturbance may result in a change of behaviours exhibited by bird SAR recorded in the HIWEC study area including Canada Warbler, Common Nighthawk, Kirtland's Warbler, Olive-sided Flycatcher and Whip-poor-will. Birds will be most vulnerable to disturbance from construction activities while nesting and rearing young in the spring and early summer. Disturbance to bird SAR during construction may result in decreased breeding success of nesting birds (EC, 2014). Disturbed nesting birds may spend more time off the nest, which could result in nest predation, nest exposure to cold temperatures and wet conditions, malnourished chicks, premature fledging and nest abandonment (EC, 2014). However, suitable nesting sites for all of these species is extensive throughout the HIWEC study area and therefore alternative breeding sites will be available during the construction phase when vegetation will be initially cleared.

Turtle Species at Risk

HIWEC construction activities, primarily the creation of access roads and access road use by construction vehicles, may result in a change of behaviours through avoidance exhibited by turtle SAR recorded in the HIWEC study area. Turtles will be most vulnerable to disturbance from construction activities while nesting and travelling to nesting sites in the spring and early summer. Eastern Musk Turtles are highly aquatic, rarely leave the water and have home ranges that are typically confined to a single body of water (COSEWIC, 2012b). Blanding's Turtles may travel more than 6 km during a given season between a variety of freshwater habitats and may nest more than 400 m from the nearest water source (COSEWIC, 2005). The mobility of Blanding's Turtles may increases their exposure to construction activities of the HIWEC study area, which in turn could elicit changes in behaviour such as avoidance of potentially suitable habitat.

Snake Species at Risk

HIWEC construction activities, primarily the creation of access roads and access road use by construction vehicles, may result in a change of behaviours through avoidance exhibited by snake SAR in the HIWEC study area. The snake SAR present in the HIWEC study area include Massasauga Rattlesnake, Eastern Foxsnake and Eastern Hog-nosed Snake. Massasauga Rattlesnake exhibits long-distance dispersal movements which can range between 1 and 4 km (COSEWIC, 2013a). Although the Eastern Foxsnake is largely confined to habitats within 1 km of the Georgian Bay shoreline within the HIWEC study area, females of this species can travel far, between approximately 879 and 6,738 m, during the active seasons (COSEWIC, 2008b). Although there are no confirmed Eastern Hog-nosed Snake observations within the HIWEC study area, this species is known to be present regionally, and also has high dispersal capabilities (COSEWIC, 2007b). Given that these snake species are highly mobile and can travel far between sites, their chances of encountering construction activities is increased which, as a result, could elicit changes in their behaviours such as avoidance.

Bat Species at Risk

Disturbance to bats may occur during construction activities within the HIWEC study area. Artificial light attracts insects and in turn can result in increased bat feeding activity in artificially illuminated areas (Rydell, 1992); however, this is not true for all bat species. Some SAR bats have been shown to avoid illuminated areas, likely due to an increased risk of predation (McGuire and Fenton, 2010). Artificial lighting which occurs near bat roosting sites can also delay the onset of evening emergence, which shortens the available time bats have to feed (Downs, *et al.* 2000; Boldogh, *et al.* 2007). Therefore, if construction occurs at night and large lights are used to illuminate construction activities near bat maternity roosts, there is potential for the artificial lighting to negatively affect the behaviour of bat SAR within the HIWEC study area.

Mitigation measures are proposed in **Section 6.3** to avoid or minimize all potential effects.

6.2.7.2 Operations

Potential effects on SAR (including Canada Warbler, Common Nighthawk, Kirtland's Warbler, Olive-sided Flycatcher, Whip-poor-will, Blanding's Turtle, Eastern Musk Turtle, Eastern Foxsnake, Eastern Hog-nosed Snake, Massasauga Rattlesnake, Little Brown Bat, Northern Myotis and Tri-colored Bat) during operation of the HIWEC include:

- Change in mortality risk (including harm); and
- Change in behaviour, due to disturbance of SAR.

These potential effects are discussed generally under the Wildlife and Wildlife Habitat VEC above. Additional details specific to SAR are described in the subsections that follow.

6.2.7.2.1 Change in Mortality Risk

Bird Species at Risk

WTG operation is associated with increased mortality risk to bird SAR. The operation of WTGs at the HIWEC may increase the risk of mortality to Canada Warbler, Common Nighthawk, Kirtland's Warbler, Olive-sided Flycatcher and Whip-poor-will. Although WTG collision mortality at wind farms is generally considered to be too low to affect bird populations, and is estimated to account for < 1 to 2 % of all human-caused avian mortalities in Canada (Erickson, *et al.* 2001; MNRF, 2011a; Calvert, *et al.* 2013), bird SAR populations may be more sensitive to the potential additional mortality associated with WTGs compared to other more common bird species populations because bird SAR populations are already relatively low and/or in decline. Based on the Wind Energy Bird and Bat Monitoring Database, which is a long-term record of the bird and bat mortalities identified at Canadian wind farms during post-construction mortality monitoring, Canada Warbler represents 0.31 percent of bird mortalities in Canada and 0.29 percent of bird mortalities in Ontario (EC, *et al*. 2014). Considering that the average annual bird mortality estimate in Ontario is 5.45 birds / WTG / year and that Canada Warbler represents 0.29 percent of bird mortalities (EC, *et al.*, 2014), approximately 1.44 Canada Warbler mortalities have the potential to occur each year in the HIWEC. Canada Warbler exhibits a low flight pattern that is direct and agile as it forages in predominately thick and low shrubby vegetation (Reitsma *et al.*, 2010). Typical heights of tall shrubs are approximately 2 m (Lee *et al.*, 1998) and it is expected that Canada Warbler would fly around this height. This is significantly lower than the WTG blade sweep that is more than 70 m above the ground. Therefore, considering Canada Warbler's flight patterns, there is a low risk of collision with operating WTGs for this species. This, in combination with mitigation measures proposed in **Section 6.3** will further reduce mortality risk to this species. Furthermore, the population estimate of Canada Warbler is approximately 2.7 million individuals with 80 percent (approximately 2.2 million individuals) of the global breeding population located in Canada (COSEWIC, 2008c). According to the second OBBA (2001-2005), the relative abundance of Canada Warbler is high throughout the Southern Shield region, which includes the HIWEC study area, the Parry Sound District, and surrounding areas (Cadman, *et al.* 2007). For these reasons, population-level effects for Canada Warbler are not anticipated.

The remaining bird SAR in the HIWEC study area (Common Nighthawk, Kirtland's Warbler, Olive-sided Flycatcher and Whip-poor-will) are not listed in the database, indicating that these species have not been recorded in post-construction mortality monitoring programs completed at Canadian or Ontario wind farms (EC, *et al.* 2014).

Common Nighthawk is widely distributed in Canada, including all provinces and territories, except Nunavut, and is estimated to contain 400,000 adults (COSEWIC, 2007b). A relative abundance map was not produced for Common Nighthawk in the second OBBA (2001-2005) because this crepuscular species was not detected on enough diurnal point counts (Cadman, *et al*. 2007). Although population declines between the first and second OBBA atlases were

largest in the Southern Shield region, breeding evidence records remain relatively numerous along its southern edge and the Georgian Bay shoreline (Cadman, *et al*. 2007). Common Nighthawk usually flies at a height of 14-50m above ground, and typically migrate at similar heights (Rust 1947; Wedgewood 1973). The highest recorded height is 250 m (Brigham *et al.*, 2011). Common Nighthawk also has aerial displays (e.g., "booming") which consist of diving from heights varying between 5m and 30m (Miller, 1925). The regularly low flight pattern exhibited by this species may contribute to its low risk of collision with operating WTGs as evidenced by the lack of Common Nighthawk mortality recorded within Canadian and Ontario wind farms.

Eastern Whip-poor-will generally breeds in central and / or southern portions of Canada's eastern provinces (Saskatchewan, Manitoba, Ontario, Quebec, Nova Scotia and New Brunswick) with a total population size estimated at 66,000 (COSEWIC, 2009). During the second OBBA (2001-2005), breeding evidence records were concentrated, although unevenly distributed, in the Southern Shield region (Cadman, et al. 2007), indicating that there is an abundance of breeding evidence records beyond the vicinity of the HIWEC study area. Eastern Whip-poor-will does not exhibit aerial flight displays for either breeding or foraging purposes (Cink, 2002), and typically flies within 20m above ground, though individuals occasionally forage as high as the canopy for prey (Cink, 2002). Therefore, considering the flight pattern of this species, it also has a low risk of collision with operating WTGs.

Olive-sided Flycatcher is widely distributed across most conifer- or mixed-forested regions of Canada with a total population size estimated at 450,000 (COSEWIC, 2007b) although the highest breeding densities of this SAR occur west of the Rocky Mountains from southern BC to California (Altman and Sallabanks, 2012). Furthermore, according to the second OBBA (2001-2005), the abundance of Olive-sided Flycatcher within and in the vicinity of the HIWEC study area is low relative to the Parry Sound District, as well as in other locations within the Southern Shield region (Cadman, et al. 2007). This species generally displays a direct flight pattern, which is fast and efficient with deep rapid wing-beats and sharp turns when pursuing prey or chasing predators (Altman and Sallabanks, 2012). Olive-sided Flycatchers often perch at the top of tall trees and sally for passing insects (MNRF, 2015a) and generally fly low close to the tree canopy level which is significantly lower than the WTG blade sweep, which is more than 70 m above ground.

Kirtland's Warbler is a globally-endangered songbird with specialized habitat (extensive young Jack Pine stands) requirements and confirmed breeding populations distributed across a few locations in Michigan, Wisconsin and Ontario (COSEWIC, 2008a). The current Canadian population of this species is unknown (Government of Canada, 2015). This species forages for insects and fruit on the ground or in low vegetation close to the ground (Bocetti, et al. 2014). Males, females and juveniles of the species exhibit slightly different flight and foraging patterns; however, all fly and forage low to the ground, and do not exhibit aerial displays (Bocetti, et al. 2014). These behaviours are expected to result in a very low risk of collision with operational WTGs during the breeding season. The Kirtland's Warbler is a long-distance Neotropical/Nearctic migrant that migrates to its wintering grounds in the Bahama Islands (COSEWIC, 2008a; Mayfield, 1988). Although flight altitude during migration for this species is not available from literature, 75 percent of Neotropical songbirds migrate between 150 and 600m above ground (Smithsonian Migratory Bird Center, 2008). The heights of turbines (i.e., hub height and length of turbine) at the HIWEC are approximately 199 m above ground. There may be a higher risk of collision with operational WTGs during migration.

The available literature discussed above suggests that the bird SAR within the HIWEC study area generally have a relatively low risk of collisions with operating WTGs due to their low flight patterns. However, with the exception of Canada Warbler, population-level effects may be possible for the remaining bird SAR if mitigation measures proposed in **Section 6.3** are not implemented.

Lighting for WTGs during the operation of the HIWEC also has the potential to increase mortality of bird SAR through collisions with WTGs (Gehring, *et al.* 2009). Development of an appropriate lighting scheme which considers light colour, duration of on-phase, and number of lit WTGs, can be used to minimize the potential impacts of these lit structures.

Brood parasitism by Brown-headed Cowbird (*Molothrus ater*) may potentially affect the reproductive success of some of the songbird SAR, including Canada Warbler, Kirtland's Warbler and Olive-sided Flycatcher. Brood parasitism is a reproductive strategy of Brown-headed Cowbird, which lays its eggs in the nests of other small passerine bird species so that its offspring are raised by the host parents. Parasitic offspring are often competitive and cause negative effects on the host species such as diminished growth rate of host's offspring, killing of host offspring, and total abandonment by the host parents of a parasitized brood (Croston and Hauber, 2010).

Kirtland's Warbler, specifically, is extremely vulnerable to cowbird nest parasitism and has experienced significant population declines as a result (COSEWIC, 2008a). However, this parasitic species is not abundant within the HIWEC study area. A total of three (3) occurrences of Brown-headed Cowbird were recorded during the 2011 and 2013 surveys as described in the *Summary of 2011, 2012 and 2013 Breeding Bird Surveys – Henvey Inlet Wind Energy Centre Study Area* (refer to Appendix A of **Appendix F1**). No occurrences of this species were recorded in 2015. Additionally, Downes and Collins (2007) suggest that recent trends show statistically significant long-term population declines for Brown-headed Cowbirds in Canada. Currently the HIWEC study area provides little breeding habitat preferred by this species which includes low or scattered trees among grassland vegetation that is typically found in agricultural areas including fence rows, orchards and pastures, as well as woodland edges (Lowther,1993). Vegetation removal within woodlands as result of construction of the HIWEC will create new edge habitats, which may be suitable for this species.

The possibility for electrocution by collision with overhead collector lines and transmission lines is not expected to pose a risk to bird SAR during the operation of the HIWEC because these are relatively small birds varying between 12cm and 26cm in total length (Altman and Sallabanks, 2012; Cink, 2002; Brigham *et al.*, 2011; Reitsma *et al*., 2010; MNRF, 2015b).It is highly unlikely that these bird species would come in contact with multiple wires simultaneously. Furthermore, most of these bird SAR exhibit low flight patterns as discussed above.

Some bird SAR observed within the HIWEC study area, including Common Nighthawk and Whip-poor-will, exhibit a tendency to sit on the shoulders of gravel roads (Cink, 2002; Poulin *et al.*, 1996). Although adult birds are often quick to move when approached, occasional maintenance vehicle traffic on access roads could result in increased risk of mortality along access roads within the HIWEC. An increased risk of moratlity to Canada Warbler, Kirtland's Warbler and Olive-sided Flycatcher as result of infrequent vehicle traffic is not expected since these species are not ground nesters and will be able to avoid vehicles travelling on access roads. HIWEC maintenance activities including the trimming of vegetation around access roads, overhead collector lines or the transmission line within breeding habitats of bird SAR also have the potential to result in the destruction of nests or, in rare instances, mortality to adult SAR birds, as well as localized disturbance. However, maintenance activities (i.e., trimming of vegetation) during operation would be infrequent (occur once every five years) and limited to within the previously cleared construction footprint for access roads, overhead collector lines and transmission lines such that minimal vegetation will be removed and disturbance to SAR birds would be considered temporary.

Turtle Species at Risk

Eastern Musk Turtles are highly aquatic, rarely leave the water except to nest within 3 to 11m from the shore, and have home ranges that are typically confined to a single body of water (COSEWIC, 2012). Blanding's Turtles may travel more than 6 km during a given season between a variety of freshwater habitats and may nest more than 400 m from the nearest water source (COSEWIC, 2005). The mobility of Blanding's Turtles increases their susceptibility to mortality associated with vehicular use of access roads during operation of the HIWEC.

Nesting female Blanding's Turtles may be attracted to the gravel along access roads within the HIWEC and, as a result, vehicular traffic on access roads during operation of the HIWEC may lead to mortality of nesting female Blanding's Turtles as well as emerging hatchlings where nests are built within gravel access roads (Standing, *et al*. 1999; COSEWIC, 2005), even with the limited use of access roads by maintenance staff. Blanding's Turtles are long-lived species with females maturing as late as 25 years in Canada, and nesting success increases with

Blanding's Turtle age (Congdon, *et al*. 1993; COSEWIC, 2005). The loss of nesting females from the population could have an effect on population growth trends (Congdon, *et al*. 1993; COSEWIC, 2005). This could be observed through the loss of nesting females from the population due to mortality on access roads. In addition to road mortality, female Blanding's Turtles may be more susceptible to capture by poachers if they spend more time along access roads within the HIWEC and if poachers have access to these areas; poaching for the pet trade is recognized as a growing threat to the species (COSEWIC, 2005).

Both Blanding's Turtles and Eastern Musk Turtles hibernate in aquatic habitats (COSEWIC, 2005; COSEWIC, 2012). As a result, removal/repair of culverts along HIWEC access roads during the winter hibernation period could result in mortality to hibernating turtle SAR.

Snake Species at Risk

Access road use during operation of the HIWEC may increase mortality risk to snake SAR, particularly Massasauga Rattlesnakes, Eastern Foxsnakes and possibly Eastern Hog-nosed Snakes. Massasauga Rattlesnakes are may not be readily visible to drivers and can be slow moving at certain times of year, making them susceptible to road mortality (COSEWIC, 2013a). Massasauga Rattlesnake road mortality can be male-based, which may contribute to female-skewed sex ratios, and is often highest in areas with high snake abundance and where roads bisect snake dispersal paths (COSEWIC, 2013a). While the Eastern Foxsnake is largely confined to habitats within 1 km of Georgian Bay shoreline, wherein much of their activity is further concentrated within 150 m of the water, within the HIWEC study area (COSEWIC, 2008b), the tendency of this species to move relatively slowly and become immobile when approached can increase its susceptibility to road mortality in areas where the HIWEC is within 1 km of Georgian Bay (COSEWIC, 2008b), even with the inconsistent use of access roads by maintenance staff. Although there are no confirmed Eastern Hog-nosed Snake observations within the HIWEC study area, it is known to be present regionally, and the wide ranging nature of this species increases its risk of mortality associated with roads (COSEWIC, 2007).

Massasauga Rattlesnakes on the eastern shore of Georgian Bay often hibernate in large groups (> 20 individuals) and have high fidelity to hibernacula sites (COSEWIC, 2013a). Eastern Foxsnakes also hibernate communally, and hibernacula for this species may be found in fissured bedrock within 1 km of Georgian Bay (COSEWIC, 2008b). As a result, HIWEC maintenance activities which disturb substrates below the frost line within wetland habitat during the winter hibernation period could result in mortality to hibernating snake SAR; however maintenance activity in wetlands (e.g. crossings) is considered highly unlikely during the hibernation period.

Bat Species at Risk

WTG operation is associated with increased mortality risk to bat SAR, including direct striking of bats in flight as well as barotraumas associated with differences in air pressure near turbine blades (COSEWIC, 2013b). The operation of WTGs at the HIWEC may increase the risk of mortality to Little Brown Bat, Northern Myotis and Tri-colored Bat. The Ontario Ministry of Natural Resources and Forestry (MNRF) has estimated that WTGs in Ontario result in the mortality of, on average, 14 bats / WTG / year, although mortality varies considerably across wind projects (MNRF, 2011b). However, Little Brown Bat, Northern Myotis and Tri-colored Bat appear to be less susceptible to WTG related mortality than long-distance migratory bat species such as Hoary and Silver-haired Bats; relatively low numbers of Little Brown Bat and very few Northern Myotis and Tri-colored Bat carcasses have been collected during post-construction mortality monitoring programs in Canada (COSEWIC, 2013b). Based on the Wind Energy Bird and Bat Monitoring Database, the average annual bat mortality estimate in Ontario is 19.08 bats/WTG/year in Ontario (EC *et al*., 2014). Little Brown Bat, Northern Myotis and Tri-coloured Bat comprised 15.7 percent, 0.41percent and 0.31percent of reported mortalities in Ontario (EC *et al*.,2014). Based on this information, approximately 272.60 Little Brown Bat, 7.12 Northern Myotis and 5.38 Tri-coloured Bat mortalities have the potential to occur each year at the HIWEC, consisting of 91 turbines.

Female bats often establish maternity colonies or roosts in large-diameter trees during the early summer (COSEWIC, 2013b). As a result, the removal of large trees such as hazard trees during maintenance of HIWEC access roads, overhead collector lines or the transmission line during the bat roosting season could result in mortality to adult female as well as juvenile Little Brown Bat, Northern Myotis and Tri-colored Bat.

Lighting for WTGs during the operation of the HIWEC also has the potential to increase mortality of bat SAR. Artificial lighting may increase bat mortality, either through increased potential for predation by nocturnal predators such as owls, through a decrease in the ability of bats to avoid collisions with large objects (McGuire and Fenton, 2010) or through potentially increasing the presence of insect prey around turbine lights. It has been suggested that insects are attracted to the increased light and/or warmth of lights (Rydell, 1992).

Although population sizes for all three bat SAR are currently unknown, it is estimated that Canadian populations for Little Brown Bat and Northern Myotis likely exceed one million mature individuals each (COSEWIC, 2013b). The population size for Tri-coloured Bat is also unknown but estimated to be possibly less than 20,000 (COSEWIC, 2013b). However, it should be noted that these population estimates are pre – White Nose Syndrome (WNS). Little Brown Bat and Northern Myotis are distributed across most of North America, with approximately 50% and 40% of the global range in Canada, respectively (COSEWIC, 2013b). Approximately 30% and 40% of Little Brown Bat and Northern Myotis is affected by WNS respectively, which is primarily responsible for the observed population declines of these species (COSEWIC, 2013b). Tri-coloured Bat is restricted to the south of Canada's eastern provinces, which together represent 15% of the global range of this species (COSEWIC, 2013b). Furthermore, most of the Canadian Tri-coloured Bat population is also being affected by WNS. Therefore, increased mortality risk associated with the operation of the HIWEC could have the potential to have population level effects for these bat SAR, whose populations are already affected by WNS, if left unmitigated. However, mitigation measures proposed in **Section 6.3** will avoid mortality risk to bat SAR.

Mitigation measures are proposed in **Section 6.3** to avoid or minimize all potential effects.

6.2.7.2.2 Change in Behaviour

Bird Species at Risk

The operation of WTGs at the HIWEC has the potential to result in minor and/or occasional changes to the behaviour of bird SAR including Canada Warbler, Common Nighthawk, Kirtland's Warbler, Olive-sided Flycatcher and Whip-poor-will. There is limited literature on the effects of WTG related disturbance on birds. Those studies that have been conducted appear to generally show little or no behavioural impact of WTGs on various bird species, although this apparent lack of evidence may also reflect deficiencies in the type or intensity of monitoring (Kingsley and Whittam, 2007).

Turtle Species at Risk

As described above, female Blanding's Turtles have been shown to be attracted to gravel roads for nesting (Standing, *et al.* 1999; Congdon, *et al.* 1993). It is possible that female Blanding's Turtles within the HIWEC study area will alter nest site selection to nest on the gravel access roads of the HIWEC, which has the potential to increase the risk of vehicular mortality and/or poaching to nesting females or emerging juveniles. Furthermore, previous studies have demonstrated that Blanding's Turtles avoid crossing roads, including roads closed to vehicular traffic and unpaved roads (Proulx, *et al.* 2014), which can contribute to reduced gene flow between isolated subpopulations (Holderegger and Giulio, 2010).

Snake Species at Risk

The snake SAR which have either been confirmed to be present (Massasauga Rattlesnake and Eastern Foxsnake) or have the potential to be present (Eastern Hog-nosed Snake) within the HIWEC study area are highly susceptible

to road mortality, as described above. HIWEC gravel access roads may present suitable basking habitat for resident snake. As such, the occasional traffic that is expected at the HIWEC during the operational phase has the potential to result in road mortality to any of these snake SAR.

Bat Species at Risk

Lighting for HIWEC operations has the potential to affect bat behaviour. Artificial light attracts insects and in turn can result in increased bat feeding activity in artificially illuminated areas (Rydell, 1992); however, this is not true for all bat species. Some bat SAR have been shown to avoid illuminated areas, likely due to an increased risk of predation (McGuire and Fenton, 2010).

Mitigation measures are proposed in **Section 6.3** to avoid or minimize all potential effects.

6.2.8 Land and Resources Used for Traditional Purposes by Aboriginal Persons

6.2.8.1 Construction and Decommissioning

Potential effects on lands and resources used for traditional purposes by Aboriginal persons during the construction and decommissioning phases of the HIWEC include:

- Change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering due to loss of habitat and disturbance to wildlife and vegetation species;
- Disturbance to current land users from construction / decommissioning noise and vibration; and
- Reduced access to on-Reserve lands during construction / decommissioning.

Construction and decommissioning activities including site preparation and the installation of permanent components including access roads, WTG's, collector and transmission lines, TSs and temporary construction areas involves the removal of vegetation and installation of permanent and temporary HIWEC infrastructure. The decommissioning process will involve removing infrastructure based on HIFN direction (some components could remain in place following decommissioning as directed by HIFN). This could involve removing the WTGs, including the tower, generator, auxiliary equipment, aboveground cables / poles, fixtures and otherwise restoring the premises to a condition similar to what existed prior to the HIWEC.

Construction and decommissioning activities will result in a change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering on- and off-Reserve. The change in land use during construction will be confined to active construction sites which could include several WTG or road locations at any given time. Land use in all areas outside of active construction areas will continue. However, primary land uses such as recreational and commercial fishing are associated with the major waterbodies (e.g., Henvey Inlet and Georgian Bay) and may continue through the construction period. HIWEC construction activities will also result in the loss of habitat and disturbance to vegetation and wildlife species used for traditional purposes on- and off-Reserve.

Noise and vibration from heavy machinery related to the transportation and installation of HIWEC components may disturb current land users and wildlife. Temporary construction noise from vehicles and other equipment has the potential to be heard within 1 km of active construction areas and may be audible beyond 1 km for blasting activities (MOECC, 2008). Vibration from construction, including blasting, should not be perceived beyond 500 m from the vibration source (MOECC, 1985). Therefore, vibration from construction, including blasting, will not be perceived beyond 500 m of the HIWEC active construction area. Disturbance from noise and vibration may affect hunting and trapping of species such as Moose, Deer and Muskrat and may have potential effects on harvesting plants used for traditional medicines or food consumption. Disturbance from noise and vibration may also affect

enjoyment of traditional activities. Noise and vibration effects during construction / decommissioning activities will be localized and occur for short durations intermittently throughout the construction / decommissioning period. The low population density currently experiences anthropogenic noise from Highway 69 and boat traffic on Georgian Bay, Henvey Inlet and Key River.

During construction and decommissioning there may be access restrictions to parts of HIFN I.R. #2 due to ongoing construction activity. Access to active construction areas during site construction and decommissioning will be limited for non-HIW authorized personnel. Any access restrictions during construction will be confined to the active construction areas and will not apply to the majority of the study area. Access plans during construction / decommissioning will allow for a continuation of land use including ongoing access to Henvey Inlet. Some areas of HIFN I.R. #2 will continue to be available for traditional uses, as permitted by HIFN and HIW policies. Any access restrictions associated with the construction and decommissioning phases would be in limited to the construction and decommissioning phases for up to 18 months. Harvesting areas for HIFN members are more common outside of the HIWEC study area.

HIFN members approved a Land Law in support of the HIWEC through a Community Approval Vote on August 9th, 2015. HIFN was involved in the HIWEC development process and supports the use of these lands for the HIWEC.

Only up to 91 WTGs will be built, so the final footprint will be even smaller than the footprint assessed in this EA (based on 120 WTGs). This approach will serve to further reduce impacts to HIFN traditional use activities and effects to wildlife and vegetation.

Mitigation measures are proposed in **Section 6.3** to avoid or minimize potential effects on lands and resources used for traditional purposes by Aboriginal persons.

6.2.8.2 Operations

Potential effects on Lands and Resources Used for Traditional Purposes by Aboriginal Persons during the operations phase of the HIWEC include:

- Change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering due to loss of habitat and disturbance to wildlife and vegetation species; and
- Disturbance to current land users from noise associated with WTGs and maintenance activity.

Operational activities including maintenance of the WTGs, collector system, transmission lines and access roads will occur intermittently throughout the operations phase. These activities will occur in areas where traditional activities may have taken place prior to the HIWEC. No trapping and limited plant gathering currently take place in the HIWEC study area; however, some hunting occurs in the fall. Traditional activities such as hunting, trapping, fishing and plant gathering on-Reserve may benefit from improved access for Band Members on their lands. Up to 1.4% of HIFN I.R. #2 land will be used for the HIWEC permanent components based on a 120 WTG layout; therefore effects to land use and wildlife habitat are confined to this area. However, only up to 91 WTGs will be constructed so the effects will be further reduced by a smaller overall footprint. Operational activities will result in a change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering.

Disturbance to current land users and wildlife may occur from noise associated with the operations phase, including operation of the WTGs and maintenance activities such as vehicle use on HIWEC access roads. WTGs have the potential to be heard within 1.5 km (MOECC, 2008); however, sound levels at all noise receptors will be within provincial standards for similar undertakings. Maintenance vehicles and other equipment during operations have the potential to be heard within 1 km (MOECC, 2008). Disturbance from noise may affect hunting and trapping of species such as Moose, Deer and Muskrat. Disturbance from noise from maintenance activity will be

infrequent and intermittent in the HIWEC study area. Harvesting areas for HIFN members are more common outside of the HIWEC study area.

HIFN members approved a Land Law in support of the HIWEC through a Community Approval Vote on August 9th, 2015. HIFN was involved in the HIWEC development process and supports the use of these lands for the HIWEC.

Mitigation measures are proposed in **Section 6.3** to avoid or minimize potential effects on lands and resources used for traditional purposes by Aboriginal persons.

6.2.9 Cultural Resources / Heritage and Archaeological Sites

6.2.9.1 Construction and Decommissioning

Potential effects on cultural resources / heritage and archaeological sites during the construction and decommissioning phases of the HIWEC include:

- Potential effects on archaeological resources;
- Potential direct and indirect effects on cultural heritage features; and
- Potential effects on cultural landscapes.

A Stage 1 archaeological assessment was conducted for the HIWEC (refer to **Appendix K1**). The assessment identified the potential for previously unidentified archaeological resources to be discovered during construction and decommissioning within the HIWEC study area. A Stage 2 archaeological field investigation was recommended. The Stage 2 archaeological assessment was conducted by AECOM (refer to **Appendix K2**).

Potential direct effects on cultural heritage features during construction and decommissioning of the HIWEC could include:

- Loss / destruction of any, or part of any, significant heritage attribute or feature;
- Displacement / alteration that is not sympathetic, or is incompatible, with the historic fabric or appearance.

Potential indirect (disruption) effects on cultural heritage features during construction and decommissioning of the HIWEC could include:

- Shadows created that alter the appearance of a heritage attribute or change the visibility of a natural feature or plantings, such as a garden;
- Isolation of a heritage attribute from its surrounding environment, context or a significant relationship;
- Land disturbance such as a change in grade that alters historic patterns of topography or drainage;
- Changes in land use such from open space to residential use, allowing new development of site alteration to fill in the formerly open spaces; and
- Obstruction of views or vistas from, within, or to a built and natural feature.

No listed, designated or otherwise recognized heritage features are present within the HIWEC study area. In addition, there are no historic plaques, cemeteries, national historic sites or properties protected by an Ontario Heritage Trust Easement. A property survey was undertaken to evaluate built heritage and cultural heritage landscapes present in the HIWEC study area, and an inventory was created to identify and evaluate potential heritage resources. Through a windshield survey, 16 structures were determined to be more than 40 years old and have potential cultural heritage value or interest. These structures include eight (8) residences, six (6) cottages, and two (2) outbuildings. The cottages, residences and one (1) of the outbuildings are considered typical of the area

and when the criteria from Ontario Regulation (O.Reg.) 9/06 were applied it was determined that they did not have cultural heritage value or interest. The remaining structure, Milton's Camp (Property #9), was identified as being of cultural heritage importance. Potential direct or indirect impacts to this cultural heritage resource were evaluated according to the criteria outlined in Info Sheet #5 in *Heritage Resources in the Land Use Planning Process, Cultural Heritage and Archaeology Policies of the Ontario Provincial Policy Statement 2005.* Based on the location of HIWEC infrastructure, which was specifically sited to avoid cultural heritage features, no negative impacts to cultural heritage resources are anticipated by the HIWEC.

Landscapes present in the HIWEC include typical transportation corridors and cottage areas, as well as areas identified, but not mapped, that have heritage significance to HIFN. Nishshing Aki is considered to have cultural heritage value or interest in accordance to the criteria set out in the Historic Sites and Monuments Board of Canada's *Criteria for Evaluating Subjects of Potential National Historic Significance* (Canadian Government 2008). Based on the location of HIWEC infrastructure, which was specifically sited to avoid cultural heritage features, no negative impacts to cultural heritage resources are anticipated by the HIWEC.

Mitigation measures are proposed in **Section 6.3** to avoid potential effects on cultural heritage resources.

6.2.9.2 Operations

General operations activities such as HIWEC, WTG, road and water crossing maintenance, and collector system repair and maintenance have the potential to affect unknown archaeological resources.

Potential effects to cultural heritage resources are not anticipated.

Mitigation measures are proposed in **Section 6.3** to avoid potential effects on unknown archaeological resources.

6.2.10 Noise

6.2.10.1 Construction and Decommissioning

Noise and vibration from heavy machinery related to the transportation and installation of HIWEC components is discussed under **Section 6.2.3** Wildlife and Wildlife Habitat, **Section 6.2.8** Land and Resources Used for Traditional Purposes by Aboriginal Persons, **Section 6.2.13** Local Residents, Cottagers and Businesses, and **Section 6.2.14** Recreation and Tourism.

6.2.10.2 Operations

Disturbance from noise associated with the operations phase, including operation of the WTGs and maintenance activities such as vehicle use on HIWEC access roads, is discussed under **Section 6.2.3** Wildlife and Wildlife Habitat, **Section 6.2.8** Land and Resources Used for Traditional Purposes by Aboriginal Persons, **Section 6.2.13** Local Residents, Cottagers and Businesses, and **Section 6.2.14** Recreation and Tourism.

6.2.11 Visual Landscape

6.2.11.1 Construction and Decommissioning

Potential effects to the visual landscape during construction / decommissioning are not anticipated.

6.2.11.2 Operations

Potential effects on the visual landscape associated with the operation of the WTGs is discussed under **Section 6.2.3** Wildlife and Wildlife Habitat, **Section 6.2.13** Local Residents, Cottagers and Businesses, and **Section 6.2.14** Recreation and Tourism.

6.2.12 Air Quality

6.2.12.1 Construction and Decommissioning

Potential air quality effects during the construction and decommissioning phases of the HIWEC include:

- Vehicle and equipment emissions contributing to a reduction in local air quality; and
- Dust generation from vehicle access and construction activity contributing to a reduction in local air quality.

Vehicle and equipment emissions and dust generation from construction and decommissioning activities will contribute to GHGs (e.g., methane, and carbon dioxide), nitrogen dioxide, sulphur dioxide and particulate matter. The emissions levels will fluctuate through the various construction and decommissioning related activities, with access road construction / reclamation, site grading, and preparation / reclamation of staging and laydown areas having the highest potential for emissions because of increased construction or decommissioning equipment activities during this time. Emissions from construction activity will not result in a measureable increase in local or regional air quality parameters.

Mitigation measures are proposed in **Section 6.3** to avoid or minimize potential effects on air quality.

6.2.12.2 Operations

Potential air quality effects during the operations phase of the HIWEC include:

- Vehicle and equipment emissions contributing to a reduction in local air quality; and
- Dust generation from maintenance vehicle access contributing to a reduction in local air quality.

Vehicle and equipment emissions and dust generation from operations and maintenance activities will contribute to similar air quality parameters as the construction and decommissioning phase but at a much smaller scale due to substantially lower vehicle volume compared to during construction and decommissioning. Emissions from operations and maintenance activity will not result in a measureable increase in local or regional air quality parameters.

Mitigation measures are proposed in **Section 6.3** to avoid or minimize potential effects on air quality.

6.2.13 Local Residents, Cottagers and Businesses

6.2.13.1 Construction and Decommissioning

Potential effects on local residents, cottagers and businesses during the construction and decommissioning phases of the HIWEC includes disturbance to local residents, cottagers and businesses from noise and vibration.

- Disturbance to local residents and businesses due to construction and decommissioning noise and vibration; and
- Reduced access to HIFN I.R. #2 by Aboriginal and non-Aboriginal residence / cottage owners on HIFN I.R. #2.

Potential noise and vibration could be caused by construction activities such as site preparation and blasting for the installation of access roads, WTG's, collector and transmission lines, TSs and temporary construction areas. Potential noise and vibration could also be caused by decommissioning activities such as removal of WTGs, including the tower, generator, auxiliary equipment, aboveground cables / poles, fixtures and otherwise restoring the premises to a condition similar to what existed prior to the HIWEC; however, some components could remain in place following decommissioning as directed by HIFN.

Temporary construction noise from vehicles and other equipment have the potential to be heard within 1 km of active construction areas and may be audible beyond 1 km for blasting activities (MOECC, 2008). Vibration from construction, including blasting, should not be evident beyond 500 m from the vibration source (MOECC, 1985). Disturbance from noise and vibration to local residents, cottagers and businesses from construction and decommissioning activities will be intermittent, site specific and limited to the construction and decommissioning phases for up to 18 months. The low population density in the study area currently experiences anthropogenic noise from Highway 69 and boat traffic on Georgian Bay, Henvey Inlet and Key River.

Access to the HIWEC during site construction and decommissioning will be limited for non-HIW authorized personnel and active construction areas will be intermittently unavailable for recreation or other purposes. Restricted areas will be limited to the areas necessary for the safe construction activities on the site. Some areas of the HIFN I.R. #2 lands will continue to be available for recreational uses during construction and decommissioning. There are currently no maintained recreational trails or facilities on HIFN I.R. #2. Therefore, effects on recreational enjoyment of the area are expected to be minimal.

Mitigation measures are proposed in **Section 6.3** to avoid or minimize potential effects on local residents, cottagers, and businesses.

6.2.13.2 Operations

Potential effects on local residents and businesses during the operations phase of the HIWEC include:

- Reduced access to HIFN I.R. #2 by Aboriginal and non-Aboriginal residence / cottage owners on HIFN I.R. #2.
- Disturbance to local residents and businesses due to noise from WTG and TS operations and maintenance; and
- Changes to the visual landscape for local residents and businesses from the operation of WTGs.

Access to HIFN I.R. #2 during operations and maintenance could be limited, periodically, for HIFN authorized personnel. Restricted areas for those authorized by HIFN to access HIFN I.R. #2 will only be areas necessary for the safe operation of the site, such as around the base of the WTGs, TSs, and the operations and maintenance building. Most areas on HIFN I.R. #2 will continue to be available for recreational uses. Increased access within HIFN I.R. #2 may provide improved recreational experiences for HIFN authorized visitors.

Potential noise effects during operations could be caused by activities including operation of the WTGs, vehicles using access roads to complete maintenance on infrastructure and equipment to complete the maintenance of the infrastructure. The maintenance activities will occur intermittently throughout the operations phase. Furthermore, minor noise effects from site maintenance activities (e.g., maintenance of the WTGs, collector system and road repairs) may be audible to local residents, cottagers and businesses adjacent to areas within the HIWEC study area that are being maintained.

Noise effects from WTGs during the operations phase were assessed within 2 km of a WTG and potential receptors. WTGs have the potential to be heard within 1.5 km (MOECC, 2008); however, sound levels at all noise

receptors will be within provincial standards for similar undertakings (refer to **Appendix M** – Noise Impact Assessment). The Noise Impact Assessment shows that all receptors will have a noise level of 40 decibels (dB) which is the sound of a quiet room. Therefore, minimal effects to local residents and businesses due to noise should occur. Maintenance vehicles and other equipment during operations have the potential to be audible within 1 km (MOECC, 2008). The low population density in the study area currently experiences anthropogenic noise from Highway 69 and boat traffic on Georgian Bay, Henvey Inlet and Key River.

Minor noise effects from site maintenance activities (e.g., maintenance of the WTGs, collector system and road repairs) may be audible by local residents and businesses within and adjacent to areas within the HIWEC study area that are being maintained. These activities are infrequent during the operations phase and will only occur as required. Noise from maintenance activities during operations is expected to lower than in the construction and decommissioning phase given the relatively smaller number of personnel and traffic required during this phase. The low population density in the study area currently experiences anthropogenic noise from Highway 69 and boat traffic on Georgian Bay, Henvey Inlet and Key River.

WTGs will be visible beyond 10 km offshore of Georgian Bay throughout the operations phase. However, there are few visual receptors in the area given the low population density of the region. The presence of WTGs throughout the operations phase will change the visual landscape as WTGs will be visible within and beyond the HIWEC study area. The HIWEC will be visible from vantage points such as from Georgian Bay and Key River. However, it has been found that not all have a negative experience while viewing WTGs nor will all have a negative recreational experience with WTGs in the area. Some may have a positive experience viewing WTGs as they represent an example of green energy and benefit HIFN members and Ontario as a whole; therefore, this effect may be adverse, neutral or positive.

Mitigation measures are proposed in **Section 6.3** to avoid or minimize potential effects on local residents, cottagers, and businesses.

6.2.14 Recreation and Tourism

6.2.14.1 Construction and Decommissioning

Potential effects on recreation and tourism during the construction and decommissioning phases of the HIWEC include:

- Avoidance of overnight accommodations and recreational activities near the HIWEC due to noise and vibration.

Potential noise and vibration could be caused by construction activities such as site preparation and blasting for the installation of access roads, WTG's, collector and transmission lines, TSs and temporary construction areas. Potential noise and vibration could also be caused by decommissioning activities such as removal of WTGs, including the tower, generator, auxiliary equipment, aboveground cables / poles, fixtures and otherwise restoring the premises to a condition similar to what existed prior to the HIWEC; however, some components could remain in place following decommissioning as directed by HIFN.

Temporary construction noise from vehicles and other equipment have the potential to be audible within 1 km of active construction areas and may be audible beyond 1 km for blasting activities (MOECC, 2008). Vibration from construction, including blasting, should not be evident beyond 500 m from the vibration source (MOECC, 1985). Therefore, vibration from construction, including blasting, will not be perceived beyond 500 m of the HIWEC active construction area. The low population density in the study area currently experiences anthropogenic noise from Highway 69 and boat traffic on Georgian Bay, Henvey Inlet and Key River.

Local overnight accommodations located within 1 km of HIWEC infrastructure include French River Provincial Park (back country camping), Key River Marina, and Camp Dore. Other overnight accommodations between 1 km and 2 km from the HIWEC infrastructure include Key Harbour Lodge and Diamond Key Lodge. Noise from construction activity will be intermittent and limited to the construction and decommissioning phases for up to 18 months. Although unlikely, overnight accommodations near the HIWEC study area may experience a decline in recreational and tourism users due to construction / decommissioning noise and vibration; however, this may be off-set by an increase in the local work force requiring accommodations near the HIWEC.

Mitigation measures are proposed in **Section 6.3** to avoid or minimize potential effects on recreation and tourism.

6.2.14.2 Operations

Potential effects on recreation and tourism during the operations phase of the HIWEC include:

- Avoidance of overnight accommodations recreational activities near the HIWEC due to noise from WTG operation;
- Avoidance of overnight accommodations and recreational activities near the HIWEC due to noise from maintenance vehicles and equipment; and
- Avoidance of overnight accommodations and recreational activities near the HIWEC from changes to the visual landscape.

Potential noise effects during operations could be caused by activities including operation of the WTGs and maintenance of the WTGs, collector system, transmission lines and roads. The maintenance activities will occur intermittently throughout the operations phase. Furthermore, minor noise effects from site maintenance activities (e.g., maintenance of the WTGs, collector system and road repairs) may be audible to people and adjacent to areas within the HIWEC study area that are being maintained.

Noise effects from WTGs during the operations phase were assessed within 2 km of a WTG and potential receptors. WTGs have the potential to be heard within 1.5 km (MOECC, 2008); however sound levels at all noise receptors will be within provincial standards for similar undertakings (refer to **Appendix M** – Noise Impact Assessment). The Noise Impact Assessment shows that all receptors will have a noise level of 40 dBA which is the sound of a quiet room. The low population density in the study area currently experiences anthropogenic noise from Highway 69 and boat traffic on Georgian Bay, Henvey Inlet and Key River. Minimal effects to local residents and businesses due to noise should occur.

Maintenance vehicles and other equipment during operations have the potential to be heard within 1 km (MOECC, 2008). Infrequent noise from site maintenance activities (e.g., maintenance activities to the WTGs, collector system and road repairs) has the potential to affect overnight accommodations and recreational activities if the accommodations and activities are in close proximity to the infrequent maintenance activities; however, the effects are expected to be minimal since on-site maintenance activity will be confined to daytime hours. Maintenance activities are infrequent during the operations phase and will only occur as required. Noise from maintenance activities during operations is expected to be lower than in the construction and decommissioning phase given the relatively smaller number of personnel and traffic required during this phase. Although unlikely, overnight accommodations within the HIWEC study area may experience a decline business due to fewer recreational and tourism users; however, this may be off-set by an increase in the local work force requiring accommodations near the HIWEC.

WTGs will be visible beyond 10 km offshore of Georgian Bay throughout the operations phase. However, there are few visual receptors in the area given the low population density of the region. The presence of WTGs throughout the operations phase will change the visual landscape as WTGs will be visible within and beyond the HIWEC study area.

The HIWEC will be visible from vantage points such as from Georgian Bay and Key River. However, it has been found that not all have a negative experience while viewing WTGs nor will all have a negatives recreational experience with WTGs in the area. Some may have a positive experience viewing WTGs as they represent an example of green energy and benefit HIFN members and Ontario as a whole; therefore, this effect may be adverse, neutral or positive.

Mitigation measures are proposed in **Section 6.3** to avoid or minimize potential effects on recreation and tourism.

6.2.15 Community Services and Infrastructure

6.2.15.1 Construction and Decommissioning

Potential effects on community services and infrastructure during the construction and decommissioning phases of the HIWEC include:

- Increase in truck traffic where the south access road crosses Bekanon Road; and
- Potential disruption to local water supply wells from construction activity.

There is the potential for intermittent changes in the flow of local traffic along Bekanon Road due to a new crossing of Bekanon Road for the HIWEC south access road. Note that Bekanon Road will not be used by construction or personal vehicles. Truck traffic and heavy machinery will temporarily increase congestion where access roads cross Bekanon Road. The large size of the WTG components may result in increased congestion at the Bekanon Road crossing, which may affect HIFN and local residents that use this road to access their homes or cottages; however, most homes and cottages are east of the proposed crossing location for the new access road and will be largely unaffected. Traffic associated with construction activity is intermittent and is limited to the construction and decommissioning phases for up to 18 months.

Potential damage or disruption to the water supply for HIFN I.R. #2 residents is highly unlikely, but could occur as a result of site activities such as blasting. In rare cases, vibrations from blasting in bedrock may alter the fracture geometry, open new fractures, change the aperture of existing fractures, or permanently change the local groundwater flow patterns.

HIW will continue to consult with NAV CANADA and Transport Canada and meet all permitting and lighting scheme requirements to ensure that there are no effects to the heliport on French River Reserve No. 13 or any other emergency response air services while WTGs are being erected. Adverse effects to local emergency services are not anticipated.

Mitigation measures are proposed in **Section 6.3** to avoid or minimize potential effects on community services and infrastructure.

6.2.15.2 Operations

Potential effects on infrastructure during the operations phase of the HIWEC include:

- Increase in truck traffic where the south access road crosses Bekanon Road.

There is the potential for intermittent changes in the flow of local traffic along Bekanon Road due to a new crossing for the HIWEC south access road. Truck traffic and heavy machinery during routine maintenance will temporarily increase congestion where access roads cross Bekanon Road. Traffic associated with operation and maintenance activity will be intermittent and short in duration.

HIW will continue to consult with NAV CANADA and Transport Canada and meet all permitting and lighting scheme requirements to ensure that there are no effects to the heliport on French River Reserve No. 13 or any other emergency response air services. Adverse effects to local emergency services are not anticipated.

HIW will continue to consult with Environment Canada regarding potential impacts to the Britt Weather Radar Station. If potential effects are identified through consultation with Environment Canada, appropriate mitigation will be implemented and residual effects are not anticipated at this time.

Mitigation measures are proposed in **Section 6.3** to avoid or minimize potential effects on community services and infrastructure.

6.3 Potential Effects, Proposed Mitigation Measures and Residual Effects

6.3.1 Construction and Decommissioning

To minimize effects during construction / decommissioning, the following mitigation measures will be implemented; any residual environmental effects after mitigation is applied are also identified in **Table 6-4**.

6.3.2 Operations

To minimize effects during operations, the following mitigation measures will be implemented; any residual environmental effects after mitigation is applied are also identified in **Table 6-5**.

Table 6-4: Potential Effects, Proposed Mitigation Measures and Residual Effects – Construction / Decommissioning

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
Soils and Terrain	• Site preparation • Construction of access roads and laydown areas • Transportation of equipment and materials (construction) • Foundation excavation and construction • WTG installation • Collector system and transmission line installation • Installation of TSs • Power connection and commissioning • Power disconnection and decommissioning • Transportation of equipment and materials (decommissioning) • Disassembly and removal of collector system components • WTG and / or tower disassembly and removal • Disassembly and removal of O&M building infrastructure • Decommissioning completion	*Changes to soil quality* • Reduction in soil quality due to mixing of topsoil and subsoils.	• Strip and store topsoil (where present) from temporary work areas separately from subsoils and maintain for reclamation use after construction. • Where topsoil quality has been compromised, import topsoil for reclamation activities (according to the Rehabilitation Plan).	*Residual effect on soil quality* • Reduction in soil quality due to mixing of topsoil and subsoils would be minimized following mitigation; however, some mixing of topsoil and subsoil may still occur.
		Changes to soil quality • Reduction in soil quality due to accidental release of contaminants during construction, heavy equipment and vehicle use, excavation, concrete truck rinsing, etc.	• Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals and to avoid soil contamination. This plan will include, for example: ▪ In the event of a contaminant spill all work will stop in the immediate area until the spill is cleaned up. ▪ Spill control and containment equipment / materials shall be readily available on site. ▪ Protocols for access to additional spill clean-up materials, if needed. ▪ Contaminated materials to be handled in accordance with relevant federal and provincial guidelines and standards. ▪ Including the use of Material Safety Data Sheets (MSDS) which provides information on proper handling of chemicals readily available for the types of chemicals that will be used on-site. ▪ Proper training of construction staff on associated emergency response and spill clean-up procedures. ▪ Spills to be cleaned up as soon as possible, with contaminated soils removed to a licenced disposal site, if required. ▪ Materials contained in spill clean-up kits are restocked as necessary. ▪ Any soil encountered during excavation that has visual staining or odours, or contains rubble, debris, cinders or other visual evidence of impacts to be analyzed to determine its quality in order to identify the appropriate disposal method. ▪ To include reporting procedures to meet federal, provincial and local requirements (e.g., reporting spills and verification of clean-up), emergency contact and HIWEC management phone numbers. • Apply the following general mitigation measures to avoid soil contamination: ▪ Ensure machinery is maintained free of fluid leaks. ▪ Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done on spill pads in specified areas at least 30 m away from wetlands and / or waterbodies. ▪ Store any stockpiled materials at least 30 m away wetlands and / or waterbodies. ▪ Store any potential contaminants (e.g., oil, fuels and chemicals) in designated areas using secondary containment, where necessary. • Undertake waste management in accordance with relevant federal and provincial guidelines and standards and construction site to be kept clear of garbage and debris. • Ensure that wash water used for the cleaning of cement construction materials does not come in contact with the ground. Deposit waste water in a concrete washout container that allows evaporation and hardening for easier disposal or recover and recycle wash water back into cement truck.	*Residual effect on soil quality* • Reduction in soil quality due to accidental release of contaminants would be minimized following mitigation; however, a minor reduction in soil quality may remain due to limitation in current spill clean-up processes.
		Changes to soil quantity and quality • Reduction in soil quantity and quality due to the release of construction dewatering discharge resulting in erosion and sedimentation.	• If dewatering of excavations is required, implement mitigation such as the use of splash pads, discharge diffusers, filter bags, sediment basins or similar measures (if required and as appropriate) at discharge locations to ensure that any water discharged to the natural environment does not result in scouring, erosion or physical alteration of the streams channel or banks. • Leave a layer of vegetation intact between the outfall and receiving waterbody to provide additional water dispersion and entrapment of suspended solids, if discharge is to a waterbody and / or wetland, where feasible. • Ensure that any overland discharge complies with previous mitigation for erosion and sedimentation included with "*Reduction in soil quality and quantity due to erosion, sedimentation and compaction resulting from excavation, use of heavy equipment and stockpiling of cleared materials.*" under the Soils and Terrain VEC. • Routine visual inspections of sediment and erosion control devices for effectiveness. • Repair and maintenance to sediment and erosion control devices performed regularly.	*No residual effects* • No reduction in soil quantity and quality due to the release of construction dewatering discharge provided recommended mitigation is implemented.
		Changes to soil quantity and quality • Reduction in soil quality and / or quantity due to erosion, sedimentation and compaction resulting from excavation, blasting, use of heavy equipment on exposed soils and stockpiling of cleared materials.	• Develop and implement an Erosion and Sediment Control Plan. • Utilize erosion blankets, sediment control fencing, straw bale, etc. for construction activities in areas where there is erosion and sedimentation potential near a wetland, woodland or waterbody. • Utilize sediment logs (compost filter sock) in areas where bedrock is exposed at surface or trenching and securing of erosion control fencing is not possible. • Maintain undisturbed buffer strips greater than 30 m in width around watercourses, where possible, except where access roads approach water crossings. • Store stockpiled material at least 30 m from a wetland or waterbody. • Monitor to ensure erosion and sedimentation control measures are in good repair and properly functioning prior to conducting daily work and re-install or repair as required prior to commencing daily construction activities for the duration of construction / decommissioning activity.	*Residual effects on soil quality and soil quantity* • Reduction in soil quality due to erosion and sedimentation would be minimized through the implementation of an Erosion and Sediment Control Plan; however, disturbance to soils within construction areas cannot be avoided and a residual reduction in soil quality and quantity in these areas may remain. • Reduction in soil quality and / or quantity due to compaction, blasting and removal of soils within construction areas would be minimized provided

Table 6-4: Potential Effects, Proposed Mitigation Measures and Residual Effects – Construction / Decommissioning

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
			• Minimize the size of cleared areas to limit the area of exposed soil. • Re-vegetate or stabilize exposed sites as soon as possible following disturbance using species native to the area to limit the duration of soil exposure. • Divert access road runoff through drainage ditches directed into vegetated areas or through environmental protection measures (such as sediment traps, rock flow check dams, sediment barriers, etc.) to ensure that exposed soils or road materials are not transported into waterbodies or wetlands. Ditches >5% in slope may require lining with appropriate sized rip rap to protect against erosion and also slow the flow velocity. • Grade disturbed / remediated slopes or stockpiles to a stable angle to avoid slope instability and reduce erosion. • Grade soil stockpiles by mechanical means to compact the soil and limit the erosion. Tracks of machinery should be perpendicular to the slope of the pile to reduce the flow velocity of rainfall over the stockpile. • Identify unstable rock structures and sensitive soils through field investigation prior to construction. If any areas of concern are identified, design modifications may be implemented (as required) to minimize potential erosion, settlement, slope instability, foundation failure or rock fall hazards as a result of construction. • Keep all equipment within identified work areas to minimize disturbance of adjacent soils. • Restrict construction equipment to designated controlled vehicle access routes to minimize the potential for soil compaction and to minimize vehicle traffic on exposed and / or sensitive soils. • Routine visual inspections of sediment and erosion control devices for effectiveness. • Repair and maintenance to sediment and erosion control devices performed regularly. • Undertake blasting operations in accordance with relevant federal and provincial guidelines and standards. • Investigate alternative rock-excavating techniques (i.e., mechanical means) where possible. • Develop and implement a Blasting Plan that includes standard best management practices (BMPs) to minimize extent of adverse noise, vibration and slope instability from blasting, including: ▪ Where feasible, the construction footprint will be microsited to select areas where blasting is not required; ▪ Follow proper drilling, explosive handling and loading procedures; ▪ Implement safe handling and storage procedures for all material, including soluble substances used for blasting; ▪ Blast mats will be used to control debris generated from blasting; ▪ Reduce blasting footprint to the extent possible; ▪ Remove all blasting debris and other associated equipment / products from the blast area. • Identify unstable rock structures through field investigations prior to construction. If any areas of concern are identified, design modifications may be implemented (as required) to minimize potential erosion, settlement, slope instability, foundation failure or rock fall hazards as a result of construction. • Routine visual inspections for slope instability performed during and after blasting operations.	recommended mitigation is implemented; however, the potential for removal and compaction of soils within construction areas may remain.
Groundwater	• Site preparation • Construction of access roads and laydown areas • Transportation of equipment and materials (construction) • Foundation excavation and construction • WTG installation • Collector system and transmission line installation • Installation of TSs • Construction completion • Power connection and commissioning • Power disconnection and decommissioning • Transportation of materials (decommissioning) • Disassembly and removal of collector system components • WTG and / or tower disassembly and removal • Disassembly and removal of O&M building infrastructure • Decommissioning completion	*Changes to groundwater quantity* • Reduction in groundwater recharge quantities due to increases in impervious surfaces.	• Minimize paved surfaces and design roads to promote groundwater infiltration. • Implement groundwater infiltration techniques to the maximum extent possible. Examples include: ▪ Releasing water to vegetated areas; ▪ Lining ditches with permeable material (rather than clay, for example); and ▪ Groundwater should remain on-site and not disposed of off-site (unless contaminated). • Where possible, direct groundwater discharge water to natural infiltration systems.	*No residual effects* • No reduction in groundwater recharge quantities anticipated provided recommended infiltration techniques and measures are implemented.
		Changes to groundwater quantity • Reduction in groundwater quantity resulting in changes in groundwater flow patterns and yield of private water wells, as a result of temporary construction dewatering and water taking activities.	• Conduct a Detailed Water Taking Assessment for WTG foundations and new water supply well locations based on geotechnical investigation results to determine anticipated groundwater taking quantities, groundwater quality and predicted zone of influence (ZOI) prior to construction. Based on this assessment site-specific mitigation measures and a monitoring program for groundwater dependent natural features and private wells within the anticipated ZOI will be provided. • Limit duration of dewatering to as short a time frame as possible. • Limit dewatering quantities by implementing targeted groundwater cut-offs (i.e., slurry trench walls) where possible. • Construct new water supply wells according to regulatory standards and be operated in a manner to conserve water (i.e., excessive water taking is avoided).	*Residual effect on groundwater quantity* • Reduction in groundwater quantity resulting in changes in groundwater flow patterns and yield of private water wells would be minimized provided the recommended mitigation measures are implemented; however, a reduction in groundwater quantity may not be avoided within the ZOI of dewatering activities, but will likely be temporary and have no long term residual effects.

Table 6-4: Potential Effects, Proposed Mitigation Measures and Residual Effects – Construction / Decommissioning

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
		Changes to groundwater quality • Reduction in groundwater quality due to the accidental release of contaminated construction dewatering discharge in areas of substantial groundwater recharge	• Develop and implement a Construction Dewatering Discharge Plan describing appropriate areas and methods for discharge. • If dewatering of excavations is required and is expected to exceed 50,000 L/day, sample discharge water daily during the days the water is discharged and tested for suspended sediments. The company shall not discharge turbid water and will comply with protocols in the Canadian Council of Ministers of the Environment (CCME) "Canadian Water Quality Guidelines for the Protection of Aquatic Life: Total Particulate Matter", which includes requirements for measuring suspended sediments, and the Provincial Water Quality Objectives (PWQO). • The Contractor shall implement appropriate measures (e.g., geosock or similar device) to reduce the amount of sediment released. • Dispose of any contaminated waste material generated from construction activities off-site by authorized and approved haulers and receivers. Where feasible, leave a layer of vegetation intact between the outfall and receiving waterbody to provide additional water dispersion and entrapment of suspended solids. • Ensure that no direct discharge to Georgian Bay, Key River, Henvey Inlet or any surface water feature outside the HIWEC will occur without acquiring applicable approvals. • Ensure that any overland discharge complies with previous mitigation for erosion and sedimentation included with "*Reduction in soil quality and quantity due to erosion, sedimentation and compaction resulting from excavation, use of heavy equipment and stockpiling of cleared materials*." under the Soils and Terrain VEC. • Should groundwater dewatering activities be expected to exceed 50,000 L/day, implement the following measures: ▪ Surround inlet pump head with clear stone and filter fabric. ▪ Regulate the discharge rate to ensure there is no flooding in the receiving waterbody and that no soil erosion is caused that impacts the receiving waterbody.	*Residual effect on groundwater quality* • Reduction in groundwater quality due to the accidental release of contaminated construction dewatering discharge in areas of substantial groundwater recharge would be minimized following mitigation; however, residual contaminants may remain in some areas of the HIWEC.
		Changes to groundwater quality and quantity • Reduction in groundwater quality (turbidity), quantity and physical damage to groundwater supply wells due to agitation of the subsurface during construction blasting (including potential release of soluble substances used during blasting) and pile driving.	• Undertake blasting operations and pile driving in accordance with relevant federal and provincial guidelines and standards. • Develop and implement a Blasting Plan that includes standard BMPs to minimize extent of adverse noise and vibration from blasting (also refer to mitigation measures for "*Reduction in soil quality and / or quantity due to erosion, sedimentation and compaction resulting from excavation, blasting, use of heavy equipment on exposed soils and stockpiling of cleared materials*" under the Soils and Terrain VEC for a list of proposed blasting BMPs). • In the event an impact to a private water well is detected, the well owner will be provided with a potable supply of water and maintain the supply until water quality conditions are comparable to baseline conditions. In the event water quality does not recover to baseline conditions, the impacted well will be modified (i.e., deepened) or a new well be constructed that is sufficient to provide the resident with a potable supply of water similar in quantity and quality of baseline conditions.	*Residual effect on groundwater quality and quantity* • Reduction in groundwater quality (turbidity) and quantity would be minimized through the development and implementation of a Blasting Plan; however, potential disturbance to the subsurface resulting in a temporary reduction in groundwater quality and / or quantity may remain. • Physical damage to groundwater supply wells would be compensated through the implementation of mitigation.
		Changes to groundwater quality • Reduction in groundwater quality due to accidental contaminant spills from vehicle and machinery operation, and concrete truck rinsing.	• Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals or to avoid contamination of adjacent waterbodies and train staff on associated procedures. • Apply the following general mitigation measures to avoid soil or water contamination: ▪ Ensure machinery is maintained free of fluid leaks. ▪ Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done in specified areas at least 30 m away from wetlands, woodlands or waterbodies. ▪ Store any stockpiled materials at least 30 m away from wetlands, woodlands or waterbodies. ▪ Store any potential contaminants (e.g., oil, fuels and chemicals) in designated areas using secondary containment, where necessary. • Also refer to mitigation measures for "*Reduction in soil quality due accidental release of contaminants during construction, heavy equipment and vehicle use, excavation, and concrete truck rinsing, etc.*" under the Soil and Terrain VEC for additional proposed mitigation measures. • Ensure that wash water used for the cleaning of cement construction materials does not come in contact with the ground. Deposit waste water in a concrete washout container that allows evaporation and hardening for easier disposal or recover and recycle wash water back into cement truck. • In the event of a contaminant release that has potential to cause harm to an individual if consumed, the spill exceeds 100 L in volume and is located less than 500 m from a private water well, the potentially affected well(s) will be included in a well monitoring program that includes water quality sampling for the suspected contaminant. In the event an impact to a private water well is detected the well owner will be provided with a potable supply of water and maintain the supply until water quality conditions are comparable to baseline conditions. In the event water quality does not recover to baseline conditions, the impacted well will be modified (i.e., deepened) or a new well be constructed that is sufficient to provide the resident with a potable supply of water similar in quantity and quality of baseline conditions.	*Residual effect on groundwater quality* • Reduction in groundwater quality due to accidental contaminant spills from vehicle and machinery operation, and concrete truck rinsing would be minimized provided a Spill Prevention and Response Plan is developed and implemented; however, residual contaminants may remain in some areas of the HIWEC.

Table 6-4: Potential Effects, Proposed Mitigation Measures and Residual Effects – Construction / Decommissioning

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
Wildlife and Wildlife Habitat (including Species of Conservation Concern)	• Site preparation • Construction of access roads and laydown areas • Transportation of equipment and materials (construction) • Foundation excavation and construction • WTG installation • Collector system and transmission line installation • Installation of TSs • Construction completion • Power disconnection and decommissioning of service • Transportation of equipment and materials (decommissioning) • Disassembly and removal of collector system components • WTG and / or tower disassembly and removal • Disassembly and removal of O&M building infrastructure • Decommissioning completion	*Habitat change* • Loss and fragmentation of wildlife habitat due to vegetation clearing.	• Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined. • Vegetation removal will be minimized to the extent possible. • Rehabilitation will be initiated within all temporary construction / decommissioning areas as appropriate to the type of habitat that was removed (e.g., replant forested areas using native stock) within one (1) year of the completion of the construction / decommissioning phase. • Where construction activities occur within 30 m of an IWH, install and maintain construction fencing (or similar delineation device) to clearly define the construction disturbance area and prevent accidental damage to vegetation. • Fell trees toward the construction footprint area to reduce damage to adjacent vegetation being retained where feasible.	*Residual effect on habitat change* • Effects on habitat change can be minimized provided recommended mitigation is implemented; however, some wildlife habitat will be removed as a result of construction of the HIWEC.
		Habitat change • Loss and fragmentation of wildlife habitat due to sub-surface excavation activities (e.g., blasting). *Change in mortality risk* • Possible mortality, harm and / or harassment to terrestrial wildlife due to sub-surface excavation activities (e.g., blasting). *Change in behaviour* • Disturbance to wildlife due to construction activities, including noise and vibration from sub-surface excavation activities (e.g., blasting).	• Reduce blasting footprint to the extent possible and undertake blasting operations in accordance with relevant federal and provincial guidelines and standards. • Blasting will not be undertaken within vegetated habitats until vegetation has been removed. • Provide suitable blasting timing windows to be included in a Blasting Plan. The Blasting Plan will include standard BMPs to minimize extent of habitat change, mortality risk and adverse noise and vibration from blasting: ▪ Where feasible, the construction footprint will be microsited to select areas where blasting is not required. ▪ Complete pre-blasting searches of wildlife by a qualified Biologist, and adjust activities accordingly if wildlife are encountered (i.e., delay blasting activities, relocate wildlife, etc.); ▪ Follow proper drilling, explosive handling and loading procedures; ▪ Implement safe handling and storage procedures for all materials, including soluble substances used for blasting; ▪ Blast mats will be used to control debris generated from blasting; ▪ Ensure wildlife (e.g., birds flying over) is not in the blasting zone prior to detonation. If wildlife is encountered in the blasting zone, postpone detonation until the wildlife has vacated the area; and ▪ Remove all blasting debris and other associated equipment / products from the blast area.	*Residual effect on change in mortality risk* • Increase in mortality risk can be minimized provided recommended mitigation is implemented; however, isolated wildlife mortality may occur as a result of construction activities such as blasting. *Residual effect on change in behaviour* • Effects on the behaviour of wildlife can be minimized provided recommended mitigation is implemented; however, some wildlife may exhibit avoidance behaviour during construction activities such as blasting.
		Change in mortality risk • Possible mortality, harm and / or harassment to terrestrial wildlife due to vegetation clearing. *Change in behaviour* • Disturbance to terrestrial wildlife due to vegetation clearing.	▪ I If vegetation must be removed* during the overall bird nesting season of April 1 to August 31, the following mitigation will apply, in accordance with the Migratory Birds Convention Act (MBCA): ▪ A qualified Avian Biologist will be on-site during clearing activities to oversee vegetation removal and conduct nest surveys as required; ▪ Within complex habitats*, removal of all vegetation is proposed to occur outside the core bird nesting season of May 1 to July 28, when a minimum of 60% of nesting activity occurs in each of the 3 habitat types, as per Environment Canada's Nesting Calendar for Zone C3 (Environment Canada 2014d). ▪ From April 1st to April 30th, nest and nesting activity searches will be conducted in areas defined as simple habitat* immediately prior to vegetation clearing. ▪ From May 1st to July 28th, nest and nesting activity searches will be conducted in simple habitat immediately prior to vegetation clearing. Vegetation clearing will not occur within complex habitats during this period. ▪ From July 29th to August 31st, nest and nesting activity searches will be conducted in simple habitat immediately prior to vegetation clearing. ▪ If an active nest or confirmed nesting activity is found, a buffer area will be implemented around the nest or nesting activity. The radius of the buffer will range depending on the species, level of disturbance and landscape context which will be confirmed by a qualified Biologist (Environment Canada 2014d), but will protect a minimum area of 10m surrounding the nest. This minimum buffer is expected to provide protection of the nest from minor work, such as vegetation clearing, access road creation, and general heavy machinery usage or vehicle operation. ▪ The nest itself will not be marked using flagging tape or other similar material as this increases the risk of nest predation; however, the outer limits of the buffer can be marked (EC, 2014b) and Universal Transverse Mercator (UTM) coordinates will be taken. • The construction footprint will be microsited within the larger permitted HIWEC Location to construct project infrastructure, such as roads, away from SAR habitats and residences and complex habitats, where possible, by a qualified Biologist. • Within those areas that provide confirmed and / or likely turtle nesting habitat (i.e., within sandy habitats, shorelines, or wetlands where turtle nesting activity has been observed or suitable habitat is within an area with concentrated turtle observations) and that are identified to be cleared of vegetation: ▪ Construction will avoid nesting areas, where possible;	*Residual effect on change in mortality risk* • Increase in mortality risk can be minimized provided recommended mitigation is implemented; however, isolated wildlife mortality may occur as a result of vegetation clearing. *Residual effect on change in behaviour* • Effects on the behaviour of wildlife can be minimized provided recommended mitigation is implemented; however, some wildlife may exhibit changes in behaviour (e.g., avoidance) as a result of vegetation clearing.

Table 6-4: Potential Effects, Proposed Mitigation Measures and Residual Effects – Construction / Decommissioning

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
			▪ In areas are unavoidable, exclusionary fencing will be installed prior to the turtle nesting / hatching period of June 1 to September 15 (Georgian Bay Biosphere Reserve (GBBR, n.d.); ▪ In the rare case where construction initially avoided and area and exclusionary fencing had not been installed prior to the turtle nesting period, a qualified Biologist will complete area searches immediately prior to construction to identify any potential nesting areas and nesting activity during the turtle nesting / hatching period of June 1 to September 15 (GBBR, n.d.); ▪ If an active nest or confirmed nesting activity is found, a buffer area will be implemented around the nest or nesting activity. The radius of the buffer will range depending on the species, level of disturbance and landscape context, which will be confirmed by a qualified Biologist. The nest itself should never be marked using flagging tape or other similar material as this increases the risk of nest predation; however, the outer limits of the buffer can be marked and UTM coordinates will be taken; and ▪ Once the Biologist has cleared the area, install turtle appropriate exclusionary fencing during construction / decommissioning within areas of concentrated turtle activity to limit road and construction-related mortality. • Stockpile areas placed prior to June 30 (turtle egg laying period; GBBR, n.d.) will be assessed by a qualified Biologist to determine if they are suitable turtle nesting habitat, and exclusionary fencing will be installed where necessary. Stockpiles placed after June 30 do not require assessment or installation of exclusionary fencing as this is after the typical period for turtle egg laying. • Removal of natural vegetation using heavy machinery within suitable turtle and / or snake hibernating habitat is proposed to occur outside the winter turtle and snake hibernation season, from October 15 to April 30 (GBBR, n.d.), within aquatic habitats or wetlands. • Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, whenever possible. • Rehabilitation will be initiated within all temporary construction / decommissioning areas as appropriate to the type of habitat that was removed (e.g., replant forested areas using native stock) within one (1) year of the completion of the construction / decommissioning phase. **Note: Complex habitats refer to habitats that contain a variety of individual nesting sites in a range of habitats. For instance, forest and shrub-dominated communities may contain nesting spots within the canopy, sub-canopy, shrub layer and ground layer, where identification of active nests may be difficult. Simple habitats refer to habitats that contain few likely nesting spots or a homogenous community where identification of active nests can be completed with confidence. For instance, open rock barrens or other sparsely vegetated habitats may be considered simple habitats, depending on site-specific vegetation cover.* *Vegetation removal will be conducted utilizing a feller buncher where vegetation will be cut close to the root and laid down along the side of the removal area. Trees/shrubs will be de-limbed and hauled off-site on a skidder.*	
		Change in mortality risk • Mortality ,harm and / or harassment to wildlife as result of vehicles using access roads.	• Clearly post speed limit signage along access roads (30 kilometres per hour (km/hr)), consider installing speed bumps within areas of concentrated wildlife activity and instruct all staff to be vigilant for wildlife while driving on site. • Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, whenever possible. • Ecopassages or designated movement corridors should be considered in areas of high reptile activity or abundance, to limit road mortality. • Develop and implement a reporting and tracking system for turtle and snake sightings as well as any wildlife mortality on access roads, which could be used to inform adaptive management for mortality, if required. • Install movement fencing in areas of high turtle and / or snake crossing activity or wildlife mortality. Monitor locations where fencing is installed to ensure that it is in good repair. • Avoid driving on access roads in proximity to amphibian breeding habitats at night between April 1 and June 30, and any rainy nights from spring to early autumn, wherever possible,	*Residual effect on change in mortality risk* • Increase in mortality risk can be minimized provided recommended mitigation is implemented; however, isolated wildlife mortality may occur as a result of vehicles using access roads.
		Habitat change • Increased erosion and sedimentation into wildlife habitat resulting from construction activity. *Habitat change* • Removal / disturbance of topsoil and increased soil compaction within wildlife habitat from manoeuvring of heavy machinery, excavation, backfilling and other construction activity.	• Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined. • Refer to mitigation measures for "*Reduction in soil quality and/or quantity due to erosion, sedimentation and compaction resulting from excavation, blasting, use of heavy equipment on exposed soils and stockpiling of cleared materials.*" under the Soils and Terrain VEC.	*No residual effect* • Effects on habitat change can be mitigated provided recommended mitigation is implemented.

Table 6-4: Potential Effects, Proposed Mitigation Measures and Residual Effects – Construction / Decommissioning

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
		Habitat change • Damage to wildlife habitat as a result of accidental soil or water contamination (including groundwater) by oils, gasoline, grease and other materials from construction equipment, materials storage and handling.	• Refer to mitigation measures for "*Reduction in soil quality due to accidental release of contaminants during construction, heavy equipment and vehicle use, excavation, and concrete truck rinsing, etc.*" under the Soils and Terrain VEC.	*Residual effect on habitat change* • Effects on habitat change can be minimized provided recommended mitigation is implemented; however, some habitat change may occur due to limitation in current spill clean-up processes.
		Habitat change • Changes in surface water drainage patterns or obstruction of lateral flows in surface water to wildlife habitat in wetlands resulting from changes in land contours. • Reductions in groundwater recharge quantities into wildlife habitat in wetlands due to increases in impervious surfaces.	• Refer to mitigation measures in "*Changes in surface water drainage patterns or obstruction of lateral flows in surface water to wetlands resulting in effects to soil moisture and species composition of vegetation*" under the Vegetation and Ecological Communities VEC. • Refer to mitigation measures for "*Reduction in soil quality due to accidental release of contaminants during construction, heavy equipment and vehicle use, excavation, and concrete truck rinsing, etc.*" under the Soils and Terrain VEC. • Refer to mitigation measures for "*Reduction in groundwater recharge quantities due to increases in impervious surfaces."* under the Groundwater VEC.	*Residual effect on habitat change* • Effects on habitat change can be minimized provided recommended mitigation is implemented; however, changes in surface water drainage patterns may result in alteration of some wildlife habitat.
		Habitat change • Loss and / or degradation of wildlife habitat due to construction dewatering activities and associated dewatering discharge.. *Change in mortality risk* Mortality, harm and harrassment to wildlife due to construction dewatering activities and associated dewatering discharge. *Change in behaviour* • Disturbance to wildlife due to construction dewatering activities and associated dewatering discharge.	• During turtle and snake hibernation period (October 15 to April 30; GBBR, n.d.), where dewatering activities may have an effect on hibernation habitat located within wetlands or aquatic features: ▪ Area will be monitored to observe any drawdown; and ▪ If there is drawdown, stop construction work and determine mitigation appropriate to the site (i.e., redirect water, monitoring rain events) through discussions with a qualified Biologist and Hydrogeologist. • Conduct a Detailed Water Taking Assessment based on geotechnical investigation results to determine anticipated groundwater taking quantities, groundwater quality and predicted ZOI prior to construction. Based on this assessment site-specific mitigation measures and a monitoring program for groundwater dependent natural features within the anticipated ZOI will be provided. • Refer to mitigation measures in "*Reduction in groundwater quantity resulting in changes in groundwater flow patterns and yield of private water wells, as a result of temporary construction dewatering and water taking activities*" under the Groundwater VEC.	*Residual effect on habitat change* • Effects on habitat change can be minimized provided recommended mitigation is implemented; however, construction dewatering may result in alteration of some wildlife habitat (e.g., water level drawdown) within the ZOI of dewatering activities. *Residual effect on change in mortality risk* • Increase in mortality can be minimized provided recommended mitigation is implemented; however, construction dewatering may result in isolated wildlife mortality within the ZOI of dewatering activities. *Residual effect on change in behaviour* • Effects on behaviour can be minimized provided recommended mitigation is implemented; however, construction dewatering may result in displacement or avoidance of wildlife within the ZOI of dewatering activities.
Vegetation and Ecological Communities	• Site preparation • Construction of access roads and laydown areas • Foundation excavation and construction • Collector system and transmission line installation • Installation of TSs • Construction completion • Disassembly and removal of collector system components • Decommissioning completion	*Change in community diversity* • Permanent loss of forest cover.	• The area of disturbance will be delineated to ensure that work does not occur outside the construction footprint. • Vegetation removal will be minimized to the extent possible. • Fell trees toward the construction footprint area to reduce damage to adjacent vegetation being retained, where feasible. • Rehabilitation will be initiated within all temporary construction / decommissioning areas as appropriate to the type of woodland that was removed (e.g., replant forested areas using native stock) within one (1) year of the completion of the construction / decommissioning phase. • Where excavation for construction of access roads, WTGs or collector lines is required within the rooting zone of trees (i.e., within 1 m of the dripline), implement proper root pruning measures to protect tree roots. • Also refer to mitigation measures under the Species at Risk VEC for additional species-specific mitigation measures.	*Residual effect for change in community diversity* • Effects on community diversity can be minimized provided recommended mitigation is implemented; however, some forest cover will be removed.
		Change in community diversity *Change in wetland quantity and function* • Increased erosion and sedimentation resulting from construction activity.	• Install and maintain sediment and erosion controls such as silt fence barriers, rock flow check dams, compost filter socks or approved alternative along the edge of the construction footprint area if within 30 m of a wetland to minimize potential sediment loading to the feature. • Also refer to mitigation measures for effects of "*Reduction in soil quality and / or quantity due to erosion, sedimentation and compaction resulting from excavation, blasting, use of heavy equipment on exposed soils and stockpiling of cleared materials*" under the Soils and Terrain VEC.	*No residual effects.* • Effect on community diversity can be mitigated provided recommended mitigation is implemented. • Effects on wetland quantity and function can be mitigated provided recommended mitigation is implemented.

Table 6-4: Potential Effects, Proposed Mitigation Measures and Residual Effects – Construction / Decommissioning

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
		Change in community diversity *Change in wetland quantity and function* • Damage to vegetation as a result of soil or water contamination (including groundwater) by oils, gasoline, grease and other materials from construction equipment, materials storage and handling.	• Refer to mitigation measures for "*Reduction in soil quality due to accidental release of contaminants during construction, heavy equipment and vehicle use, excavation, and concrete truck rinsing, etc.*" under the Soils and Terrain VEC. • Also refer to mitigation measures for "*Reduction in groundwater quality due to the accidental release of contaminated construction dewatering discharge in areas of substantial groundwater recharge*" under the Groundwater VEC.	*Residual effect on change in community diversity* • Effects on community diversity can be minimized provided recommended mitigation is implemented; however, some changes to community diversity may occur due to limitation in current spill clean-up processes. *Residual effect on change in wetland quantity and function* • Effects on wetland quantity and function can be minimized provided recommended mitigation is implemented; however, some damage to wetlands may occur due to limitation in current spill clean-up processes.
		Change in wetland quantity and function • Permanent loss of wetlands.	• Vegetation removal will be minimized to the extent possible. • Site permanent infrastructure outside of wetlands to the extent possible. • Where excavation of a wetland cannot be avoided, the area of disturbance will be delineated to ensure that work does not occur outside the construction footprint. • Where construction activities occur within 30 m of a wetland, install and maintain construction fencing (or similar delineation device) to clearly define the construction footprint area to prevent accidental damage to vegetation. • Preserve topsoil (and therefore seed bank), where present, for use during rehabilitation. • Fell trees toward the construction footprint area to reduce damage to adjacent vegetation being retained, where feasible. • Rehabilitation will be initiated within all temporary construction / decommissioning areas as appropriate to the type of wetland that was removed (e.g., replant swamp areas using native stock, consider transplanting native wetland species into temporarily disturbed areas suitable for wetland planting) within one (1) year of the completion of the construction / decommissioning phase. • Where excavation for construction of access roads, WTGs or collector lines is required within the rooting zone of trees (i.e., within 1 m of the dripline), implement proper root pruning measures to protect tree roots. • Also refer to mitigation measures under the Species at Risk VEC for additional species-specific mitigation measures.	*Residual effect for change in wetland quantity and function* • Effects on wetland quantity and function can be minimized provided recommended mitigation is implemented; however, some wetlands will be removed.

		Change in wetland quantity and function
		• Changes in surface water drainage patterns or obstruction of lateral flows in surface water to wetlands resulting in effects to soil moisture and species composition of vegetation.
		• Reductions in groundwater recharge quantities into wetlands due to increases in impervious surfaces.
			• Ensure BMPs are used to maintain current drainage patterns, including:
			  ▪ Minimize paved surfaces and design roads to promote infiltration;
			  ▪ Limit changes in land contours to the maximum extent possible; and
			  ▪ Ensure roadway culverts are designed and installed to maintain existing drainage patterns.
			• Where the installation of a flow equalizing culvert is proposed, appropriate erosion control measures (e.g., rip rap, seeding) will be installed at the ends of each culvert to prevent erosion which can change land contours.
			• Also refer to mitigation measures in "*Reduction in groundwater recharge quantities due to increases in impervious surfaces*" under the Groundwater VEC.
				Residual effect on change in wetland quantity and function
				• Effects on wetland quantity and function can be minimized provided recommended mitigation is implemented; however, changes in surface water drainage patterns may result in some effects on wetland quantity and function.

		Change in wetland quantity and function • Change in wetland function due to reduced water levels caused by temporary construction dewatering activities and associated dewatering discharge.	• Conduct a Detailed Water Taking Assessment based on geotechnical investigation results to determine anticipated groundwater taking quantities, groundwater quality and predicted ZOI prior to construction. Based on this assessment site-specific mitigation measures and a monitoring program for groundwater dependent natural features within the anticipated ZOI will be provided. • Also refer to mitigation measures in "*Reduction in groundwater quantity resulting in changes in groundwater flow patterns and yield of private water wells, as a result of temporary construction dewatering and water taking activities*" under the Groundwater VEC. • Also refer to mitigation measures under the Species at Risk VEC for additional species-specific mitigation measures.	*Residual effect on change in wetland quantity and function* • Effects on wetland quantity and function can be minimized provided recommended mitigation is implemented; however, construction dewatering may result in some effects on wetland quantity and function within the ZOI of dewatering activities.
		Change in species diversity *Change in wetland quantity and function* • Damage to wetland vegetation due to increased dust accumulation.	• Use water as a dust suppressant, as needed, along areas where construction activities are located within 5 m of a wetland. • In the event that dust accumulates on leaves of wetland plants, which may reduce photosynthesis, water will be used to wash dust off of vegetation. • Also refer to mitigation measures for "*Dust generation from vehicle use and construction activity contributing to a reduction in local air quality*" under the Air Quality VEC.	*No residual effects* • Effects on species diversity can be mitigated provided recommended mitigation is implemented. • Effects on wetland quantity and function can be mitigated provided recommended mitigation is implemented.

Table 6-4: Potential Effects, Proposed Mitigation Measures and Residual Effects – Construction / Decommissioning

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
Surface Water	• Site preparation • Construction of access roads and laydown areas • Transportation of equipment and materials • Foundation excavation and construction • WTG installation • Collector system and transmission line installation • Installation of TSs • Construction completion • Disassembly and removal of collector system components • WTG and / or tower disassembly and removal • Disassembly and removal of O&M building infrastructure • Decommissioning completion	*Changes to surface water quality* • Reduction in surface water quality from erosion and sedimentation.	• **Erosion and Sediment Control** ▪ A Sediment and Erosion Control Plan will be prepared prior to construction start. ▪ Implement sediment and erosion control measures prior to construction near wetlands or waterbodies and maintain such measures until re-vegetation of disturbed areas is complete. ▪ Monitoring to ensure erosion and sedimentation control measures are in good repair and properly functioning prior to conducting daily work and re-install or repair as required prior to commencing daily construction activities. ▪ In areas where bedrock is exposed at surface or trenching and securing of erosion control fencing is not possible, sediment logs (compost filter sock) may be utilized. ▪ Ensure an additional supply of erosion and sediment control materials are readily available on the site. ▪ Minimize removal of riparian vegetation to the greatest extent possible (maintaining riparian shrubs) in order to limit the area of exposed soil. ▪ In the Erosion and Sediment Control Plan include measures (e.g., monitoring and response) should a flood or higher water levels occur due to adverse weather events. ▪ Discharge water through energy dissipation and filtration systems (filter bag, sediment basin), as required. Ensure the volume of water is controlled and ensure that any water discharged to the natural environment does not result in scouring, erosion or physical alteration of the streams channel or banks. ▪ Use temporary crossing structures or other practices to cross waterbodies with steep and highly erodible (e.g., dominated by organic materials and silts) banks and beds. ▪ Remove non-biodegradable erosion and sediment control materials once site is stabilized. • **Grading and Excavation** ▪ Grade disturbed / remediated slopes or stockpiles to a stable angle to avoid slope instability and reduce erosion. ▪ Where construction activities occur within 30 m of a waterbody, ensure BMPs are used to maintain current existing drainage patterns, including: ▪ Limit changes in land contours to the maximum extent possible. ▪ Ensure roadway culverts are designed and installed to maintain existing drainage patterns. ▪ Where the installation of a flow equalizing culvert is proposed, appropriate erosion control measures (i.e., rip rap, seeding) will be installed at the ends of each culvert to prevent erosion. • **Equipment Use** ▪ In order to avoid compacting or hardening of natural ground surface, and to avoid movement of machinery on sensitive slopes, restrict construction equipment to designated controlled vehicle access routes and to within identified work areas. ▪ Whenever possible, operate machinery from outside the waterbody and on land above the high water mark or on ice in a manner that minimizes disturbance to the banks and bed of the waterbody. ▪ Limit machinery fording (if required) to only the amount necessary and only outside of sensitive time periods and upon consultation with a qualified Environmental Monitor. If repeated fording of the waterbody is required, construct a temporary crossing structure (e.g., jersey bridge, swamp mats). ▪ Ensure machinery is maintained free of fluid leaks. ▪ Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done in specified areas at least 30 m away from wetlands and waterbodies. ▪ Wash water used for the cleaning of cement construction materials not to come in contact with the ground. Deposit waste water in a concrete washout container that allows evaporation and hardening for easier disposal or recover and recycle wash water back into cement truck. ▪ Use and maintain emission control devices on motorized equipment (as provided by the manufacturer of the equipment) to minimize the emissions so that they remain within industry standards. Heavy equipment and machinery to be used within operating specifications. ▪ Run vehicles and equipment only when necessary (i.e., limit idling). • **Blasting** ▪ Undertake blasting operations in accordance with relevant federal and provincial guidelines and standards. ▪ Develop and implement a Blasting Plan that includes standard BMPs to minimize extent of adverse noise, vibration and slope instability from blasting, including: – Where feasible, the construction footprint will be microsited to select areas where blasting is not required;	*Residual effect to surface water quality* • Reduction in surface water quality through releases of sediment can be minimized through the implementation of an Erosion and Sediment Control Plan, however minor sediment releases may still occur.

Table 6-4: Potential Effects, Proposed Mitigation Measures and Residual Effects – Construction / Decommissioning

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
			– Follow proper drilling, explosive handling and loading procedures; – Implement safe handling and storage procedures for all material, including soluble substances used for blasting; – Blast mats will be used to control debris generated from blasting; – Reduce blasting footprint to the extent possible; – Do not use ammonium nitrate based explosives near water due to the production of toxic by-products; and – Remove all blasting debris and other associated equipment / products from the blast area. ▪ In the event of fish mortality, immediately stop all work and correct the cause of the mortality. ▪ Report the fish kill immediately to DFO and HIFN. ▪ If release of significant blast rock, dust or residues is detected, suspend blast work until additional mitigations as required are in place. • **Water Quality** ▪ Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals or to avoid contamination of adjacent waterbodies and train staff on associated procedures. ▪ Turbid water shall not be discharged to a watercourse or wetland. ▪ Vegetation management will be done using mechanical techniques rather than herbicides. • **Material Stockpiling and Handling** ▪ Stabilize and store stockpiled materials (topsoil, grubbed materials) above the high water mark and 30 m away from wetlands and waterbodies. Transmission and collector poles or other structures will be placed above the normal high water mark. ▪ Soil stockpiles to be graded by mechanical means to compact the soil and limit the erosion. Tracks of machinery should be perpendicular to the slope of the pile to reduce the flow velocity of rainfall over the stockpile. ▪ Place only clean materials free of fine particulate matter in the water for temporary construction measures (e.g., coffer dams to be constructed of 'pea gravel' bags / meter bags, geotextile fabric, sheet pile or other clean material). ▪ Waste management to be completed in accordance with relevant federal and provincial guidelines and standards. ▪ Dispose of any contaminated waste material generated from construction activities off-site by authorized and approved haulers and receivers. • **Rehabilitation** ▪ Re-vegetate or stabilize exposed sites as soon as possible following disturbance using species native to the area to limit the duration of soil exposure. • **Work Area** ▪ Delineate work areas. ▪ Maintain undisturbed buffer strips greater than 30 m in width around waterbodies and wetlands, where possible, except where access roads approach waterbody and wetland crossings. ▪ Restrict vehicle traffic to posted speed limits. ▪ Investigate complaints related to dust and emissions and address to the extent possible. • **Monitoring** ▪ Monitor on-site conditions (i.e., erosion and sediment control, spills, flooding, etc.) where construction occurs within 30 m of a watercourse on the following basis: – Weekly during active construction periods. – Prior to, during and post forecasted large rainfall events (>20 mm in 24 hours) or significant snowmelt events (i.e., spring freshet). – Daily during extended rain or snowmelt periods. – Monthly during inactive construction periods, where the site is left alone for 30 days or longer.	

Table 6-4: Potential Effects, Proposed Mitigation Measures and Residual Effects – Construction / Decommissioning

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
	• Site preparation • Construction of access roads and laydown areas • Transportation of equipment and materials (construction) • Foundation excavation and construction • Construction of O&M building infrastructure • WTG installation • Collector system and transmission line installation • Installation of TSs • Construction completion • Transportation of equipment and materials (decommissioning) • Disassembly and removal of collector system components • WTG and / or tower disassembly and removal • Disassembly and removal of O&M building infrastructure • Decommissioning completion	*Changes to surface water quality* • Reduction in surface water quality due to accidental spills including fuels, lubricants, and concrete washing near waterbodies.	• **Equipment Use (see above)** • **Water Quality (see above)** • **Spills** • Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals or to avoid contamination of adjacent waterbodies and train staff on associated procedures. • Apply the following general mitigation measures to avoid soil or water contamination: ▪ Ensure machinery is maintained free of fluid leaks. ▪ Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done in specified areas at least 30 m away from natural features (wetlands, woodlands and wildlife habitats) or waterbodies. ▪ Store any stockpiled materials at least 30 m away from wetlands, woodlands, wildlife habitats, or waterbodies. • Store any potential contaminants (e.g., oil, fuels and chemicals) in designated areas using secondary containment, where necessary	*Residual effect on surface water quality* • Reduction in surface water quality from accidental spills can be mitigated provided a Spill Prevention and Response Plan is developed and implemented, however some minor effects may remain due to limitations in current spill clean-up processes.
		Changes to surface water quality and quantity • Potential effects on surface water quality and quantity due to dewatering discharge.	• **Dewatering Activities** ▪ Limit duration of dewatering to as short a time frame as possible. ▪ Develop and implement a Construction Dewatering Discharge Plan describing appropriate areas and methods for discharge. ▪ Leave a layer of vegetation intact between the outfall and receiving waterbody to provide additional water dispersion and entrapment of suspended solids, if discharge is to a waterbody and / or wetland, where feasible. ▪ Discharge water shall not be directed to a waterbody that has potential to flood as a result of the added input of water caused by direct dewatering discharge. ▪ Screen all hoses drawing water from a waterbody to prevent potential entrainment of fish and other species. ▪ If dewatering of excavations is required, mitigation could include the use of splash pads, discharge diffusers, filter bags, sediment basins or similar measures (if required and as appropriate) at discharge locations to ensure that any water discharged to the natural environment does not result in scouring, erosion or physical alteration of the streams channel or banks. ▪ If dewatering of excavations is required and expected to exceed 50,000 L/day, discharge water shall be sampled daily during the days the water is discharged and tested for suspended sediments. If the increase in suspended sediments is greater than 25 milligrams per litre (mg/L), appropriate measures (e.g., geosock or similar device) to mitigate these impacts will be implemented. ▪ Limit water taking quantities by implementing targeted groundwater cut-offs (i.e., slurry trench walls) where possible. ▪ No direct discharge to Georgian Bay, Key River, Henvey Inlet or any surface water feature outside the HIWEC will occur without acquiring applicable approvals. • **Water Management** ▪ Should groundwater dewatering activities be expected to exceed 50,000 L/day, the following measures will be implemented: – Inlet pump head shall be surrounded with clear stone and filter fabric. ▪ The discharge shall be regulated at such a rate that there is no flooding in the receiving waterbody and that no soil erosion is caused that impacts the receiving waterbody. ▪ Conduct a Detailed Water Taking Assessment based on geotechnical investigation results to determine anticipated groundwater taking quantities, groundwater quality and predicted ZOI prior to construction. Based on this assessment site-specific mitigation measures and a monitoring program for groundwater dependent natural features within the anticipated ZOI will be provided. ▪ Where feasible, leave a layer of low cover vegetation intact between the outfall and receiving waterbody to provide additional water dispersion and entrapment of suspended solids. ▪ No direct discharge to Georgian Bay, Key River, Henvey Inlet or any surface water feature outside the HIWEC will occur without acquiring applicable regulatory approvals. ▪ Divert access road runoff through drainage ditches directed into vegetated areas or through environmental protection measures (such as sediment traps, rock flow check dams, sediment barriers, etc.) to ensure that exposed soils or road materials are not transported into watercourses or wetlands. Ditches >5% in slope may require lining with appropriate sized rip rap to protect against erosion and also slow the flow velocity. ▪ Apply measures for managing water flowing onto the construction site as well as water being pumped / diverted from the construction site such that sediment is filtered out prior to the water entering a waterbody or wetland.	*No residual effect* • Effects on surface water quality and quantity from dewatering discharge can be mitigated provided recommended mitigation is implemented.

Table 6-4: Potential Effects, Proposed Mitigation Measures and Residual Effects – Construction / Decommissioning

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
			▪ Minimize paved surfaces and design roads to promote groundwater infiltration. ▪ Implement groundwater infiltration techniques to the maximum extent possible. Examples include: – Releasing water to vegetated areas; – Ditches should not be lined with an impermeable material (i.e., clay); and – Groundwater should remain on-site and not disposed of off-site (unless contaminated). ▪ Where possible, groundwater discharge water shall be directed to areas of groundwater recharge to allow for natural infiltration to the groundwater system. • **Water Quality (see above)** • **Monitoring (see above)**	
	• Site preparation • Construction of access roads and laydown areas • Transportation of equipment and materials • Foundation excavation and construction • Construction of O&M building infrastructure • Collector system and transmission line installation • WTG installation • Installation of TSs • Disassembly and removal of collector system components • WTG and / or tower disassembly and removal • Disassembly and removal of O&M building infrastructure • Decommissioning completion	*Changes to surface water quantity* • Potential for alteration to local surface water quantity due to loss of vegetation, changes in surficial topography and changes in surficial soils in disturbed construction areas including along access roads.	• **Water Crossing Design** ▪ Design water crossings to accommodate high and low flows of the watercourse. • **Erosion and Sediment Control (see above)** • **Water management (see above)** • **Grading and Excavation (see above)** • **Rehabilitation (see above)** • **Monitoring (see above)**	*Residual effect on surface water quantity* • Alterations to local surface water quantity can be minimized provided recommended mitigation is implemented (e.g., proper culvert sizing and rehabilitation and enhancement activities), however minor changes to water quantity may occur.
Fish and Fish Habitat	• Site preparation • Construction of access roads and laydown areas • Collector system and transmission line installation • WTG installation • Installation of TSs • Disassembly and removal of collector system components • WTG and / or tower disassembly and removal	*Changes to fish habitat* *Changes to fish mortality* • Potential for disturbance of aquatic biota (fish and invertebrates) and aquatic habitat during water crossing installation and removal (due to in-water work, alteration to channel bed, banks and riparian area, due to erosion and sedimentation)	• **Water Crossing Design** ▪ Design water crossings installed at waterbodies supporting direct fish habitat to facilitate fish passage. ▪ Design water crossings to accommodate high and low flows of the waterbody. ▪ High sensitivity waterbodies will be avoided by using clear span structures (WB-S-M39-8 and WB-N-M26-21). • **Crossing Installation** ▪ If streams are flowing during waterbody crossing structure installation, use appropriate work site isolation techniques (e.g., dam and pump, bypass channel, partial coffer damming) to minimize impacts on aquatic environment. If work sites are isolated during construction, fish are to be salvaged from isolated area and transferred to undisturbed habitat downstream of the work site. ▪ Phase crossing structure removal so no fording of watercourses is required following structure removal (i.e., the last activity as the road is being decommissioned). • **Timing Windows** ▪ Time in-water work to avoid sensitive life stages of fish species (i.e., spawning) for waterbodies, as follows: – No in-water work from October 1 to July 15 ▪ WB-N-M4-59 – No in-water work from March 15 to July 15 ▪ WEC North (WB-N-M32-14, WB-N-M6-3, WB-N-M12-12-2, WB-N-M12-12, WB-N-M26-21, WB-N-M26-31, WB-N-M28-16, WB-N-M35-1, WB-A-M3-3); ▪ WEC South (WB-S-M17-29, WB-S-M30-11, WB-S-M39-8, WB-S-M19-6, WB-S-M34-53, WB-S-M13-13) • **Blasting (see above)** • **Work Area (see above)** • **Equipment Use (see above)** • **Erosion and Sediment Control (see above)** • **Material Stockpiling and Handling (see above)** • **Grading and Excavation (see above)** • **Dewatering Activities (see above)** • **Rehabilitation (see above)** • **Monitoring** ▪ Monitor all in-water work to ensure mitigation is applied and to identify any disturbances to fish habitat. ▪ Document any changes resulting from construction activities and obtain photographic documentation.	*Residual effect on fish habitat and fish mortality* • Disturbances to aquatic biota and aquatic habitat due to water crossing installation and removal will be minimized following effective implementation of recommended mitigation measures, such as in-water work timing windows and an Erosion and Sediment Control Plan, however, some change to fish habitat will remain at localized areas associated with temporary access road crossings. • Localized and temporary residual effects on high sensitivity waterbodies due to use of clear span structures at these water crossings and no "serious harm" (as per *Fisheries Act*) may still occur.

Table 6-4: Potential Effects, Proposed Mitigation Measures and Residual Effects – Construction / Decommissioning

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
	• Site preparation • Construction of access roads and laydown areas • Transportation of equipment and materials • Collector system and transmission line installation • Installation of TSs • Construction completion • Disassembly and removal of collector system components • WTG and / or tower disassembly and removal • Disassembly and removal of O&M building infrastructure • Decommissioning completion	*Changes to fish habitat* *Changes to fish mortality* • Potential for effects on aquatic biota (fish, invertebrates) and aquatic habitat due to accidents and / or spills including fuels, lubricants and concrete washing near waterbodies.	• **Equipment Use (see above)** • **Material Stockpiling and Handling (see above)** • **Spills (see above)**	*Residual effect on fish habitat and fish mortality* • Effects on aquatic biota and aquatic habitat can be minimized from accidents and / or spills provided a Spill and Prevention Plan is developed and implemented, however some minor effects on aquatic biota and aquatic habitat may occur due to limitations in current spill clean-up processes.
	• Foundation excavation and installation of WTG • Construction of access road • Construction of collection line crossing • Installation of poles for overhead transmission line	*Changes to fish mortality* • Potential for disturbance to fish and fish habitat and changes in mortality of fish due to construction blasting and / or vibration (includes disturbance to or mortality of fish eggs or larvae).	• **Blasting (see above)** • **Timing Windows (see above)** • **Monitoring (see above)** ▪ Monitor effectiveness of mitigation and protection measures for blasting. ▪ In the event of fish mortality, stop all work and correct the cause of the mortality. ▪ Report the fish kill immediately to DFO, MNRF and HIFN. ▪ Suspend blasting until additional mitigation measures are applied.	*Residual effects on fish mortality* • Disturbance to fish habitat and changes in mortality of fish due to blasting are unlikely, but minimized provided recommended mitigation is implemented, however fish mortality may occur.
Species at Risk	• Site preparation • Construction of access roads and laydown areas • Transportation of equipment and materials (construction) • Foundation excavation and construction • WTG installation • Collector system and transmission line installation • Installation of TSs • Construction completion • Power disconnection and decommissioning of service • Transportation of equipment and materials (decommissioning) • Disassembly and removal of collector system components • WTG and / or tower disassembly and removal • Disassembly and removal of O&M building infrastructure • Decommissioning completion	*Habitat change (including possible damage, destruction and / or fragmentation of avian SAR residences or avian SAR habitat).* *Change in behaviour, due to disturbance of SAR.* *Change in mortality risk (including harm, harassment and / or killing of SAR)* <u>Avian Species at Risk</u> Canada Warbler (*Cardellina pusilla*) • Up to 31.6 ha (1.7%) of suitable habitat loss Common Nighthawk (*Chordeiles minor*) • Up to 141.7 ha (2.4%) of suitable habitat loss Kirtland's Warbler (*Setophaga kirtlandii*) • Up to 116.9 ha (3.0%) of suitable habitat loss Olive-sided Flycatcher (*Contopus borealis*) • Up to 9.3 ha (0.7%) of suitable habitat loss Eastern Whip-poor-will (*Caprimulgus vociferous*). Up to 172.8 ha (2.3%) of suitable habitat loss	▪ If vegetation must be removed* during the overall bird nesting season of April 1 to August 31, the following mitigation will apply, in accordance with the Migratory Birds Convention Act (MBCA): ▪ A qualified Avian Biologist will be on-site during clearing activities to oversee vegetation removal and conduct nest surveys as required; ▪ Within complex habitats*, removal of all vegetation is proposed to occur outside the core bird nesting season of May 1 to July 28, when a minimum of 60% of nesting activity occurs in each of the 3 habitat types, as per Environment Canada's Nesting Calendar for Zone C3 (Environment Canada 2014d). ▪ From April 1st to April 30th, nest and nesting activity searches will be conducted in areas defined as simple habitat* immediately prior to vegetation clearing. ▪ From May 1st to July 28th, nest and nesting activity searches will be conducted in simple habitat immediately prior to vegetation clearing. Vegetation clearing will not occur within complex habitats during this period. ▪ From July 29th to August 31st, nest and nesting activity searches will be conducted in simple habitat immediately prior to vegetation clearing. ▪ If an active nest or confirmed nesting activity is found, a buffer area will be implemented around the nest or nesting activity. The radius of the buffer will range depending on the species, level of disturbance and landscape context which will be confirmed by a qualified Biologist (Environment Canada 2014d), but will protect a minimum area of 10m surrounding the nest. This minimum buffer is expected to provide protection of the nest from minor work, such as vegetation clearing, access road creation, and general heavy machinery usage or vehicle operation. ▪ The nest itself will not be marked using flagging tape or other similar material as this increases the risk of nest predation; however, the outer limits of the buffer can be marked (EC, 2014b) and Universal Transverse Mercator (UTM) coordinates will be taken. ▪ The construction footprint will be microsited within the larger permitted HIWEC Location to construct project infrastructure, such as roads, away from SAR habitats and residences and complex habitats, where possible, by a qualified Biologist. If this is not possible, appropriate timing windows, clearing restrictions, and nest buffers will be applied (see above). ▪ Blasting will not be undertaken within vegetated habitats until vegetation has been removed. ▪ Develop and implement a Blasting Plan, that might include, but will not be limited to: ▪ Blasting will only occur in areas that have already been cleared of vegetation; ▪ Where feasible, the construction footprint will be microsited to select areas where blasting is not required. ▪ Blast mats will be used to control debris generated from blasting; ▪ Prior to blasting, a qualified Biologist will conduct an area search of the proposed blasting area to ensure no SAR birds are present (e.g. ground-nesting birds); ▪ Ensure wildlife (e.g. birds flying over) are not in the blasting zone prior to detonation. If wildlife is encountered in the blasting zone, postpone detonation until the wildlife has vacated the area;	*Residual effect on habitat change* • Effects on the habitat of avian SAR including possible damage or destruction of residences can be minimized provided recommended mitigation is implemented; however, some avian SAR habitat will be removed. Some fragmentation of bird SAR habitat may also occur, although it will be minimized with the application of the recommended mitigation measures. *Residual effect on change in behaviour* • Effects on the behaviour of avian SAR due to disturbance from construction activities can be minimized provided recommended mitigation is implemented; however, some avian SAR may exhibit changes in behaviour during construction activities. *Residual effect on change in mortality risk* • Increased mortality risk (including harm) to avian SAR can be minimized provided recommended mitigation is implemented; however, isolated avian SAR mortality is possible.

Table 6-4: Potential Effects, Proposed Mitigation Measures and Residual Effects – Construction / Decommissioning

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
			▪ Follow proper drilling, explosive handling and loading procedures; ▪ Implement safe handling and storage procedures for all materials, including soluble substances used for blasting; ▪ Remove all blasting debris and other associated equipment/products from the blast area. ▪ Minimize vegetation removal and limit to within the construction footprint area. The construction footprint will be clearly defined. Delineation will be in the form of flagging tape, wooden stakes and/or silt fence barriers that will each provide clear identification of the construction limits. With respect to the latter (silt fence barriers), these will be implemented if sedimentation control is also required. ▪ Rehabilitation will be initiated within all temporary construction / decommissioning areas as appropriate to the type of habitat that was removed (e.g., replant forested areas using native stock) within one (1) year of the completion of the construction / decommissioning phase. Although it is not possible to calculate the area of temporary disturbance associated with access roads due to micrositing and site-specific conditions, the temporary disturbance area associated with turbine construction / decommissioning is approximately 17.3 ha. ▪ Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. ▪ Clearly post speed limit signs along access roads (30 km/hr), consider installing speed bumps within areas of concentrated wildlife activity and instruct all staff to be vigilant for wildlife while driving on site. ▪ Develop and implement a Sighting Response Protocol in the Wildlife Management Plan which will include: ▪ Education of all on-site staff about SAR that may be encountered; ▪ Immediate stop in construction activity within 10 m of an observation of a SAR until a qualified Biologist can confirm the species has vacated the construction disturbance footprint. In lieu of calling a Biologist, work can be resumed after a 24 hr period if no evidence of the species exists within the immediate area of previous observation. If the species still exists within the immediate area after 24 hr, a qualified Biologist will be contacted to provide appropriate direction; ▪ For animals in immediate danger, handling procedures will be established for designated personnel (i.e., Environmental Monitor, qualified Biologist) in the event that a SAR needs to be moved out of potential harm; ▪ Maintain a species observation log to track species observations during the construction / decommissioning phase of the project so that adaptive management can be applied based on species concentrations; ▪ All required permits under Section 73(2) of SARA will be obtained prior to handling SAR; ▪ Reporting procedures (e.g., frequency to HIFN and EC-CWS). ▪ Post SAR Fact Sheets in areas where on-site staff can become familiar with possible species encounters. ▪ The following mitigation measures will be implemented with respect to the Environmental Construction Monitor: ▪ An Environmental Monitor will be on site during all construction activities. ▪ Additional Environmental Monitors will be present during key construction activities including vegetation removal, dewatering and blasting, and as required to ensure compliance with environmental requirements. ▪ Environmental Construction Monitors will also complete daily, weekly and monthly monitoring of general and specific activities/measures (such as monitoring ecopassages and culverts to ensure that no debris is compromising their use, effectiveness of erosion and sedimentation control measures, fuel storage tanks etc. ▪ Environmental Construction Monitors will also keep daily logs of their activities and note any non-compliance issues. Any non-compliance issues will be provided to the General Contractor for immediate follow-up. **Note: Complex habitats refer to habitats that contain a variety of individual nesting sites in a range of habitats. For instance, forest and shrub-dominated communities may contain nesting spots within the canopy, sub-canopy, shrub layer and ground layer, where identification of active nests may be difficult. Simple habitats refer to habitats that contain few likely nesting spots or a homogenous community where identification of active nests can be completed with confidence. For instance, open rock barrens or other sparsely vegetated habitats may be considered simple habitats, depending on site-specific vegetation cover.* *Vegetation removal will be conducted utilizing a feller buncher where vegetation will be cut close to the root and laid down along the side of the removal area. Trees/shrubs will be de-limbed and hauled off-site on a skidder.*	
		Habitat change (including possible damage, destruction and / or fragmentation of turtle SAR residences or turtle SAR habitat) *Change in behaviour, due to disturbance of SAR* *Change in mortality risk(including harm, harassment and / or killing of SAR)*	▪ Within those areas that provide confirmed and / or likely turtle nesting habitat (i.e., within sandy habitats, shorelines, soil-filled cracks in rock barren, or wetlands where turtle nesting activity has been observed or suitable habitat is within an area with concentrated turtle observations) and that are identified to be cleared of vegetation* between June 1 and September 15: ▪ Construction will avoid nesting areas where possible; ▪ In suitable nesting areas that are unavoidable, exclusionary fencing will be installed around the extent of the construction footprint that overlaps nesting habitat prior to the turtle nesting / hatching period of June 1 to September 15 (GBBR, n.d.) to prevent turtle nesting activity prior to construction activities;	*Residual effect on habitat change* • Effects on the habitat of turtle SAR including possible damage or destruction of residences can be minimized provided recommended mitigation is implemented; however, some turtle SAR habitat will be removed. No residual effects of habitat fragmentation are anticipated for turtle SAR provided recommended mitigation is implemented.

Table 6-4: Potential Effects, Proposed Mitigation Measures and Residual Effects – Construction / Decommissioning

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
		Turtle Species at Risk Blanding's Turtle (*Emydoidea blandingii*) • Up to 157.9 ha (2.3%) of suitable habitat loss • Eastern Musk Turtle (*Sternotherus odoratus*)Up to 24.6 ha (1.0%) of suitable habitat loss	▪ In the rare case where construction initially avoided and area and exclusionary fencing had not been installed prior to the turtle nesting period, a qualified Biologist will complete area searches immediately prior to construction to identify any potential nesting areas and nesting activity during the turtle nesting / hatching period of June 1 to September 15 (GBBR, n.d.); ▪ Once the Biologist has cleared the area, install turtle appropriate exclusionary fencing during construction / decommissioning within areas of concentrated turtle activity to limit road and construction-related mortality; and ▪ If an active nest or confirmed nesting activity is found, a buffer area will be implemented around the nest or nesting activity. The radius of the buffer will range depending on the species, level of disturbance and landscape context which will be confirmed by a qualified Biologist but will be protected by a minimum of 30 m surrounding the nest. This minimum buffer is expected to provide protection of the nest from minor work, such as vegetation clearing, access road creation, and general heavy machinery usage or vehicle operation. The nest itself should never be marked using flagging tape or other similar material as this increases the risk of nest predation; however, the outer limits of the buffer can be marked and UTM coordinates will be taken. ▪ Field crews will immediately stop work for all turtles observed within the construction area during area searches and observe whether the individual(s) vacate the construction area. Should observed turtle(s) (except for nesting turtles) that are encountered within the construction area not vacate the construction area, they will be relocated to an area of similar habitat at least 50 m, but less than 300 m to where they were found by a qualified Biologist / Handler or Environmental Monitor. A distance of 300 m represents the approximate distance of the home range of the turtle SAR considered in this report (Milam & Melvin 2001, Blanding's Turtle Recovery Team 2015). In the highly unlikely event that similar habitat is not found within those parameters, the turtle will be relocated to the next closest location of similar habitat. All required permits under Section 73(2) of *SARA* will be obtained prior to handling SAR. ▪ Construction activities will not proceed within 30 m of any confirmed turtle nest during the period of June 1 to September 15 (GBBR, n.d.). ▪ Removal of natural vegetation within suitable turtle hibernating habitat (wetland and aquatic habitat) will be completed by hand from October 15 to April 30 (GBBR date unknown), when feasible. ▪ If vegetation clearing must occur within suitable turtle hibernating habitat (wetland and aquatic habitat) through use of heavy machinery between October 15 to April 30 (GBBR date unknown), best management practices for heavy machinery usage within wetlands will be used to reduce impact on overwintering turtles. Best management practices may include, but are not limited to, low ground pressure equipment, wide tires, rubberized tracks, swamp mats, lightweight equipment, varying paths (British Columbia Ministry of Environment 2009), and low tire inflation pressure (Alakukku et al. 2003). ▪ Heavy machinery will be required to cross wetlands during the turtle hibernation period of October 15 to April 30 (GBBR date unknown). Where these crossings are necessary, heavy machinery will cross at the most narrow crossing location (as deemed reasonable) or as close to the edge as possible within the construction footprint. Best management practices for heavy machinery use in wetlands will also be applied, which may include, but will not be limited to, low ground pressure equipment, wide tires, rubberized tracks, swamp mats, lightweight equipment, varying paths (British Columbia Ministry of Environment 2009), and low tire inflation pressure (Alakukku et al. 2003).The construction footprint will be microsited within the larger permitted HIWEC Location to construct project infrastructure, such as roads, away from SAR habitats and residences and complex habitats, where possible, by a qualified Biologist. If this is not possible, appropriate timing windows, clearing restrictions, and nest buffers will be applied (see above). ▪ Henvey Inlet Wind will install a minimum of 6 artificial nesting mounds within the HIWEC Area. Artificial nesting mounds will be created strategically throughout the site (without additional disturbance) by using a method developed by Paterson et al. (2013) that combines a mixture of gravel (60%) and sand (40%) into a pile that is approximately 6m across and 0.5 m high. Nest mounds will be preferentially placed within 100 m of a habitat that contains open aquatic features. Mounds will also be placed in areas where turtle observations have occurred and on the same side of the access road as the open aquatic habitat. ▪ During the turtle hibernation period (October 15 to April 30; GBBR, n.d.) where dewatering activities may have an effect on hibernation habitat located within wetlands or aquatic features: ▪ Area will be monitored to observe any drawdown; and ▪ If there is drawdown, stop construction work and determine mitigation appropriate to the site (i.e., redirect water, monitoring rain events) through discussions with a qualified Biologist and Hydrogeologist. ▪ Water levels in wetlands or aquatic features adjacent to turtle hibernation sites (or if known to be hydrologically connected) will be taken prior to and during dewatering activities.	*Residual effect on change in behaviour* • Effects on the behaviour of turtle SAR due to disturbance from construction activities can be minimized provided recommended mitigation is implemented; however, turtle SAR may elicit changes in behaviour such as avoidance. *Residual effect on change in mortality risk* • Increased mortality risk (including harm) to turtle SAR can be minimized provided recommended mitigation is implemented; however, isolated turtle SAR mortality is possible.

Table 6-4: Potential Effects, Proposed Mitigation Measures and Residual Effects – Construction / Decommissioning

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
			▪ Conduct a Detailed Water Taking Assessment based on geotechnical investigation results to determine anticipated groundwater taking quantities, groundwater quality and predicted ZOI prior to construction. Based on this assessment site-specific mitigation measures and a monitoring program for groundwater dependent natural features within the anticipated ZOI will be provided, and may include where feasible: ▪ Monitor surface water levels in potentially affected groundwater-dependent natural features prior-to and during dewatering activitiesand compare to site-specific thresholds and early warning indicators for water level drawdown; ▪ Monitor shallow groundwater levels and vertical hydraulic conductivity in potentially affected groundwater-dependent natural features, where installation of mini-piezometer devices is possible (e.g. areas with a minimum of 40 cm soil depth). Monitor groundwater levels prior-to and during dewatering and compare to site-specific thresholds for groundwater level drawdown; ▪ Visual inspection of vegetation health during construction; and ▪ In the event surface water levels and/or groundwater level drawdown exceeds established site-specific thresholds mitigation measures may include where appropriate the diversion of groundwater dewatering discharge to affected feature following appropriate water quality control (e.g. sediment tanks, filter bags, flow diversion, soaker hoses, etc.). ▪ Limit duration of dewatering to as short a time frame as possible. ▪ Limit dewatering quantities by implementing targeted groundwater cut-offs (i.e., slurry trench walls) under specific conditions, which will assist in stopping the infiltration of groundwater into the excavations. ▪ Construct new water supply wells according to regulatory standards and be operated in a manner to conserve water (i.e., excessive water taking is avoided). ▪ Develop and implement a Blasting Plan, that might include, but will not be limited to: ▪ Blasting will only occur in areas that have already been cleared of vegetation; ▪ Where feasible, the construction footprint will be microsited to select areas where blasting is not required. ▪ No blasting will occur in wetland or open aquatic habitats; ▪ Blast mats will be used to control debris and sound generated from blasting; ▪ Pre-blast species searches will be completed by a qualified Biologist prior to any blasting activity that occurs during the active period for turtles (April 15 to September 30). If a turtle SAR is encountered during a pre-blast search, it will be relocated to an area of similar habitat at least 50 m from the area proposed for blasting; and ▪ Follow proper drilling, explosive handling and loading procedures. ▪ Minimize vegetation removal and limit to within the identified construction footprint. The construction footprint will be clearly defined prior to vegetation removal. Delineation will be in the form of flagging tape, wooden stakes and/or silt fence barriers that will each provide clear identification of the construction limits. With respect to the latter (silt fence barriers), these will be implemented if sedimentation control is also required. ▪ Rehabilitation activities will be initiated within all temporary construction / decommissioning areas where suitable habitat for SAR turtles is affected to satisfy the habitat requirements (e.g., installation of artificial nesting structures) for these species within one (1) year of the completion of the construction / decommissioning phase. Although it is not possible to calculate the area of temporary disturbance associated with access roads due to micrositing and site-specific conditions, the temporary disturbance area associated with turbine construction/decommissioning is approximately 17.3ha. ▪ Ecopassages, or designated movement corridors, will be installed in areas of high turtle activity or abundance to limit road mortality, in areas where constructability allows the installation of these structures. Seven ecopassages will be installed using large corrugated steel or box culverts designs. In addition, two (2) clear-span bridges will also be installed within the HIWEC study area to facilitate turtle movement between habitats without crossing over a road. ▪ Movement fencing will be installed on either side of the ecopassage, providing site-specific conditions allow installation, to encourage the use of the ecopassage. Chain-link fencing, in combination with geotextile fabric or wire meshing will be used to provide a barrier to juveniles, as this is the most effective type of movement fencing for turtles (McIntosh Perry 2013). Fencing will be constructed to be 60 cm in height. An overhanging lip of 10-20 cm on the species side should be used to prevent turtles from climbing the fence. Fences should be installed with a turn-around at the ends to assist in redirecting turtles away from any fence openings. Curving the fence inward may help to reduce access to these locations. ▪ Repair any fencing or boundary delineation materials, if damaged or otherwise not functioning properly, as identified by the Environmental Monitor, project staff, or construction personnel.	

Table 6-4: Potential Effects, Proposed Mitigation Measures and Residual Effects – Construction / Decommissioning

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects

			▪ Road mortality surveys will be conducted twice a week from April 1 to October 31 during the construction and decommissioning phases to monitor the effectiveness of ecopassages/designated movement corridors and turtle mortality rates. These surveys will consist of a combination of incidental observations while driving along access roads and targeted walking surveys at areas of high turtle activity. All construction staff will be required to report to the Environmental Monitor any SAR turtle mortality or turtle activity on roads, as per the Sighting Response Protocol.
			▪ Any documented road mortality of a SAR turtle species will trigger consideration of contingency measures and adaptive management (e.g., access road closure or additional ecopassages, speed bump, or wildlife crossing sign). The selected approach will be based on the specific circumstances that contributed to the observed impact on the species and will be determined by a qualified Biologist for the purpose of further mitigating against potential impacts to the species.
			▪ Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.
			▪ Clearly post speed limit and wildlife crossing signs along access roads (30 km/hr), consider installing speed bumps within areas of concentrated turtle activity and instruct all staff to be vigilant for wildlife while driving on site.
			▪ Develop and implement a Sighting Response Protocol in the Wildlife Management Plan which will include:
			  ▪ Education of all on-site staff about SAR that may be encountered;
			  ▪ Immediate stop in construction activity within 10 m of an observation of a SAR until a qualified Biologist can confirm the species has vacated the construction disturbance footprint. In lieu of calling a Biologist, work can be resumed after a 24 hour (hr) period if no evidence of the species exists within the immediate area of previous observation. If the species still exists within the immediate area after 24 hr, a qualified Biologist will contacted to provide appropriate direction;
			  ▪ For animals in immediate danger, handling procedures will be established for designated personnel (i.e., Environmental Monitor, qualified Biologist) in the event that a SAR needs to be moved out of potential harm;
			  ▪ Maintain a species observation log to track species observations during the construction / decommissioning phase of the HIWEC so that adaptive management can be applied based on species concentrations;
			  ▪ All required permits under Section 73(2) of *SARA* will be obtained prior to handling SAR; and
			  ▪ Reporting procedures (e.g., frequency to HIFN and EC-CWS).
			▪ Post SAR Fact Sheets in areas where on-site staff can become familiar with possible species encounters.
			▪ The following mitigation measures will be implemented with respect to the Environmental Construction Monitor:
			  ▪ An Environmental Monitor will be on site during all construction activities.
			  ▪ Additional Environmental Monitors will be present during key construction activities including vegetation removal, dewatering and blasting, and as required to ensure compliance with environmental requirements.
			  ▪ Environmental Construction Monitors will also complete daily, weekly and monthly monitoring of general and specific activities/measures (such as monitoring ecopassages and culverts to ensure that no debris is compromising their use, effectiveness of erosion and sedimentation control measures, fuel storage tanks etc.
			  ▪ Environmental Construction Monitors will also keep daily logs of their activities and note any non-compliance issues. Any non-compliance issues will be provided to the General Contractor for immediate follow-up.
			**Vegetation removal will be conducted utilizing a feller buncher where vegetation will be cut close to the root and laid down along the side of the removal area. Trees/shrubs will be de-limbed and hauled off-site on a skidder.*	

		Habitat change, (*including possible damage, destruction and / or fragmentation of snake SAR residences or snake SAR habitat)* *Change in behaviour, due to disturbance of SAR* *Change in mortality risk*(*including harm, harassment and / or killing of SAR)* <u>Snake Species at Risk</u> Eastern Foxsnake (Georgian Bay population) (*Pantherophis gloydi pop. 1*) • Up to 90.2 ha(1.0%) of suitable habitat loss	▪ Trained Rattlesnake Monitors will be present on-site during key construction activities including vegetation removal and blasting, and as required to ensure compliance with environmental requirements. ▪ During the active period for snakes, from April 30 to October 15 (GBBR, n.d.), a Rattlesnake Monitor will complete area searches immediately prior to vegetation removal and blasting to identify any snake activity. ▪ Field crews will immediately stop work for all snakes observed within the construction area and observe whether the individual(s) vacate the construction area. Should observed snake(s) encountered within the construction area not vacate the construction area, they will be relocated to an area of similar habitat at least 50 m, but less than 300 m, from the area where the activity is occurring by a trained Rattlesnake Monitor. ▪ Removal of all natural vegetation within suitable nesting habitats is proposed to occur outside the nesting / early neonate season of July 1 to October 15 (Ontario Nature, 2014; COSEWIC, 2008b; GBBR, n.d.) within sandy habitats or shorelines. ▪ Henvey Inlet Wind will utilize blast rocks to create suitable gestation, basking, and retreat sites for Massasauga. A minimum of 12 individual sites will be established throughout the HIWEC Area. Although preference will be for these habitats to be located away from access roads, consideration will be given to the potential disturbance associated with using machinery to transport the rock. Each location will be placed within 1 km of a habitat suitable for hibernation, and locations will be preferentially chosen to occur in areas where potential gestation sites were removed during construction.	*Residual effect on habitat change* • Effects on the habitat of snake SAR including possible damage or destruction of residences can be minimized provided recommended mitigation is implemented; however, some snake SAR habitat will be removed. No residual effects of habitat fragmentation are anticipated for snake SAR provided recommended mitigation is implemented. *Residual effect on change in behaviour* • Effects on the behaviour of snake SAR due to disturbance from construction activities can be minimized provided recommended mitigation is implemented; however, snake SAR may elicit changes in their behaviours such as avoidance.

Table 6-4: Potential Effects, Proposed Mitigation Measures and Residual Effects – Construction / Decommissioning

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects

		Eastern Hog-nosed Snake (*Heterodon platirhinos*)
		• Up to 171.1 ha (3.9%)
		
		Massasauga Rattlesnake (Great Lakes / St. Lawrence population) (*Sistrurus catenatus pop. 1*)
		• Up to 189.1 ha (2.2%) of suitable habitat loss
		• Up to 174.1 ha (2.3%) of critical habitat
			▪ Removal of natural vegetation within suitable snake hibernation habitat (wetland habitat) will be completed by hand from October 15 to April 30 (GBBR date unknown), when feasible.
			▪ If vegetation clearing must occur within suitable snake hibernation habitat (wetland) through the use of heavy machinery between October 15 to April 30 (GBBR date unknown), best management practices for heavy machinery usage within wetlands will be used to reduce impact on overwintering snakes. Best management practices may include, but are not limited to, low ground pressure equipment, wide tires, rubberized tracks, swamp mats, lightweight equipment, varying paths (Wetland Stewardship Partnership 2009), and low tire inflation pressure (Alakukku et al. 2003).
			▪ Heavy machinery will be required to cross wetlands during the snake hibernation period of Octber 15 to April 30 (GBBR date unknown). Where these crossings are necessary, heavy machinery will cross that most narrow crossing location (as deemed reasonable) or as close to the edge as possible within the construction footprint. Best management practices for heavy machinery use in wetlands will also be applied, which may include, but will not be limited to, low ground pressure equipment, wide tires, rubberized tracks, swamp mats, lightweight equipment, varying paths (Wetland Stewardship Partnership 2009), and low tire inflation pressure (Alakukku et al. 2003).
			▪ The construction footprint will be microsited within the larger permitted HIWEC Location to construct project infrastructure, such as roads, away from SAR habitats and residences and complex habitats, where possible, by a qualified Biologist. If this is not possible, appropriate timing windows and clearing restrictions will be applied (see above).
			▪ During the snake hibernation period (October 15 to April 30; GBBR, n.d.) where dewatering activities may have an effect on hibernation habitat located within wetlands or aquatic features:
			  ▪ Area will be monitored to observe any drawdown; and
			  ▪ If there is drawdown, stop construction work and determine mitigation appropriate to the site (i.e., redirect water, monitoring rain events) through discussions with a qualified Biologist and Hydrogeologist.
			▪ Water levels in wetlands or aquatic features adjacent to snake hibernation sites (or if known to be hydrologically connected) will be taken prior to and during dewatering activities.
			▪ Conduct a Detailed Water Taking Assessment based on geotechnical investigation results to determine anticipated groundwater taking quantities, groundwater quality and predicted ZOI prior to construction. Based on this assessment site-specific mitigation measures and a monitoring program for groundwater dependent natural features within the anticipated ZOI will be provided, and may include where feasible:
			  ▪ Monitor surface water levels in potentially affected groundwater-dependent natural features prior-to and during dewatering and compare to site-specific thresholds and early warning indicators for water level drawdown;
			  ▪ Monitor shallow groundwater levels and vertical hydraulic conductivity in potentially affected groundwater-dependent natural features, where installation of mini-piezometer devices is possible (e.g. areas with a minimum of 40 cm soil depth). Monitor groundwater levels prior-to and during dewatering and compare to site-specific thresholds for groundwater level drawdown;
			  ▪ Visual inspection of vegetation health during construction; and
			  ▪ In the event surface water levels and/or groundwater level drawdown exceeds established site-specific thresholds mitigation measures may include where appropriate the diversion of groundwater dewatering discharge to affected feature following appropriate water quality control (e.g. sediment tanks, filter bags, flow diversion, soaker hoses, etc.).
			▪ Limit duration of dewatering to as short a time frame as possible.
			▪ Limit dewatering quantities by implementing targeted groundwater cut-offs (i.e., slurry trench walls), under specific conditions, which will assist in stopping the infiltration of groundwater into the excavations.
			▪ Develop and implement a Blasting Plan, that might include, but will not be limited to:
			  ▪ Blasting will only occur in areas that have already been cleared of vegetation;
			  ▪ Where feasible, the construction footprint will be microsited to select areas where blasting is not required.
			  ▪ No blasting will occur in wetland or open aquatic habitats;
			  ▪ Blast mats will be used to control debris and sound generated from blasting;
			  ▪ Pre-blast species searches will be completed by a qualified Biologist prior to any blasting activity that occurs during the active period for snakes (April 15 to September 30). If a snake SAR is encountered during a pre-blast search, it will be relocated to an area of similar habitat at least 50 m, but less than 300 m, from the area proposed for blasting. In the highly unlikely event that similar habitat is not found within those parameters, the snake will be relocated to the next closest location of similar habitat; and
			  ▪ Follow proper drilling, explosive handling and loading procedures.
			• Minimize vegetation removal and limit to within the identified construction footprint. The construction footprint will be clearly defined prior to vegetation removal. Delineation will be in the form of flagging tape, wooden
				Residual effect on change in mortality risk
				• Increased mortality risk (including harm) to snake SAR can be minimized provided recommended mitigation is implemented; however, isolated snake SAR mortality is possible.

Table 6-4: Potential Effects, Proposed Mitigation Measures and Residual Effects – Construction / Decommissioning

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects

			stakes and/or silt fence barriers that will each provide clear identification of the construction limits. With respect to the latter (silt fence barriers), these will be implemented if sedimentation control is also required.
			• Where possible, avoid construction activities within the boundaries of suitable nesting habitat for Eastern Hog-nosed Snake.
			• Site transmission line poles outside the boundaries of suitable nesting habitat for Eastern Hog-nosed Snake, if possible.
			▪ Rehabilitation activities will be initiated within all temporary construction / decommissioning areas where suitable habitat for SAR snakes is affected to satisfy the habitat requirements (e.g.; pile of blast rock, artificial gestation / hibernation structures may be created on site) for these species within one (1) year of the completion of the construction / decommissioning phase. Although it is not possible to calculate the area of temporary disturbance associated with access roads due to micrositing and site-specific conditions, the temporary disturbance area associated with turbine construction/decommissioning is approximately 17.3ha.
			▪ Ecopassages, or designated movement corridors, will be installed in areas of high snake activity or abundance to limit road mortality, in areas where constructability allows the installation of these structures. Seven ecopassages will be installed using large corrugated steel or box culverts designs. In addition, two (2) clear-span bridges will also be installed within the Project Area to facilitate snake movement between habitats without crossing over a road.
			▪ Movement fencing will be installed on either side of the ecopassage, providing site-specific conditions allow installation, to encourage the use of the ecopassage by snake SAR. Chain-link fencing, in combination with geotextile fabric or wire meshing will be used to provide a barrier to juveniles, as this is the most effective type of movement fencing for turtles (McIntosh Perry 2013). Fencing will be constructed to be 60 cm in height. An overhanging lip of 10-20 cm on the species side should be used to prevent turtles from climbing the fence. Fences should be installed with a turn-around at the ends to assist in redirecting turtles away from any fence openings. Curving the fence inward may help to reduce access to these locations.
			▪ If a mortality of Eastern Foxsnake is observed, movement fencing will be increased to 200cm in height to prohibit Eastern Foxsnake from gaining access to the road (OMNR 2013).
			▪ Install exclusionary fencing around the extent of the construction footprint that is adjacent to concentrated Massasauga activity during construction / decommissioning within areas (where feasible), to limit road and construction-related mortality.
			▪ Repair any fencing or boundary delineation materials, if damaged or otherwise not functioning properly, as identified by the Environmental Monitor, project staff, or construction personnel.
			▪ All construction vehicles and equipment that are parked overnight or left idle for over 1 hour within the Project Area between April 1 and November 30 will be surveyed for the presence of snakes before ignition.
			▪ Road mortality surveys will be conducted twice a week from April 1 to October 31 during the construction and decommissioning phases to monitor the effectiveness of ecopassages/designated movement corridors and snake mortality rates. These surveys will consist of a combination of incidental observations while driving along access roads and targeted walking surveys at areas of high snake activity. All construction staff will be required to report to the Environmental Monitor any SAR snake mortality or snake activity on roads, as per the Sighting Response Protocol.
			▪ Any documented road mortality of a SAR snake species will trigger consideration of contingency measures and adaptive management (e.g., access road closure or additional ecopassages, speed bump, or wildlife crossing sign). The selected approach will be based on the specific circumstances that contributed to the observed impact on the species and will be determined by a qualified Biologist for the purpose of further mitigating against potential impacts to the species.
			▪ Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.
			▪ Clearly post speed limit and wildlife crossing signs along access roads (30 km/hr), consider installing speed bumps within areas of concentrated snake activity and instruct all staff to be vigilant for wildlife while driving on site.
			▪ Develop and implement a Sighting Response Protocol in the Wildlife Management Plan which will include:
			  ▪ Education of all on-site staff about SAR that may be encountered;
			  ▪ Immediate stop in construction activity within 10 m of an observation of a SAR until a qualified Biologist can confirm the species has vacated the construction disturbance footprint. In lieu of calling a Biologist, work can be resumed after a 24 hr period if no evidence of the species exists within the immediate area of previous observation. If the species still exists within the immediate area after 24 hr, a qualified Biologist will contacted to provide appropriate direction;	

Table 6-4: Potential Effects, Proposed Mitigation Measures and Residual Effects – Construction / Decommissioning

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
			▪ For animals in immediate danger, handling procedures will be established for designated personnel (i.e., Environmental Monitor, qualified Biologist) in the event that a SAR needs to be moved out of potential harm; ▪ Maintain a species observation log to track species observations during the construction / decommissioning phase of the HIWEC so that adaptive management can be applied based on species concentrations; ▪ All required permits under Section 73(2) of *SARA* will be obtained prior to handling SAR; ▪ Reporting procedures (e.g., frequency to HIFN and EC-CWS); and ▪ A communication strategy to educate and engage persons who will be working on site will be implemented to reduce any persecution of these species. ▪ Post SAR Fact Sheets in areas where on-site staff can become familiar with possible species encounters. ▪ The following mitigation measures will be implemented with respect to the Environmental Construction Monitor: ▪ An Environmental Monitor will be on site during all construction activities. ▪ Additional Environmental Monitors (e.g., Rattlesnake Monitors) will be present during key construction activities including vegetation removal, dewatering and blasting, and as required to ensure compliance with environmental requirements. ▪ Environmental Construction Monitors will also complete daily, weekly and monthly monitoring of general and specific activities/measures (such as monitoring ecopassages and culverts to ensure that no debris is compromising their use, effectiveness of erosion and sedimentation control measures, fuel storage tanks etc. ▪ Environmental Construction Monitors will also keep daily logs of their activities and note any non-compliance issues. Any non-compliance issues will be provided to the General Contractor for immediate follow-up.	
		Habitat change, (including possible damage, destruction and / or fragmentation of bat SAR residences or bat SAR habitat) *Change in behaviour, due to disturbance of SAR* *Change in mortality risk,(including harm, harassment and / or killing of SAR)* <u>Bat Species at Risk</u> • Little Brown Bat (*Myotis lucifugus*)Up to 189.1 ha (2.2%) of suitable habitat loss Northern Myotis (*Myotis septentrionalis*) • Up to 189.1 ha (2.2%) of suitable habitat loss Tri-colored Bat (*Perimyotis subflavus*) • Up to 189.1 ha (2.2%) of suitable habitat loss	▪ Any suitable cavity trees within forested areas, and any suitable rock crevices in areasproposed for removal during the bat roosting season (April 30 to September 1) will be searched for signs of maternity roosts by a qualified Biologist prior to any construction activities that may affect the habitat. ▪ Searches will initially consist of visual scans of the habitat for signs of use to determine the likelihood of occupancy. ▪ If habitat assessments confirm that a site is being used, or likely being used, evening exit surveys will be completed to confirm whether individuals are actively using a particular site. ▪ If an active roost site is found within the construction footprint: ▪ A buffer will be implemented around the site. The radius of the buffer will range depending on the species, type of roosting (bachelor or day roosting versus maternity roosting), level of disturbance and landscape context, which will be confirmed by a qualified Biologist experienced in bat ecology. The UTM of the roost location will be recorded, and the limits of the buffer area will be clearly identified. ▪ Since roost locations regularly move within a season, the removal of trees or blasting can occur once a qualified Biologist provides confirmation that the roost site is no longer being used, providing that disturbance activities occur within 24hrs as to not allow for re-occupation of the habitat. ▪ If habitat assessments and/or exit surveys indicate a site is not being used, there is no restriction on proposed activity. • Minimize vegetation removal and limit to within the construction footprint. The construction footprint will be clearly defined prior to vegetation removal. Delineation will be in the form of flagging tape, wooden stakes and/or silt fence barriers that will each provide clear identification of the construction limits. With respect to the latter (silt fence barriers), these will be implemented if sedimentation control is also required. The construction footprint will be microsited within the larger permitted HIWEC Location to construct project infrastructure, such as roads, away from SAR habitats and residences and complex habitats, where possible, by a qualified Biologist. If this is not possible, appropriate timing windows and clearing restrictions will be applied (see above). • Following the construction phase, erect a minimum of 10 artificial roosting structures within the HIWEC study area, which may include bat houses and/or artificial bark. ▪ Rehabilitation will be initiated within all temporary construction / decommissioning areas as appropriate to the type of habitat that was removed (e.g., replant forested areas using native stock) within one (1) year of the completion of the construction / decommissioning phase. Although it is not possible to calculate the area of temporary disturbance associated with access roads due to micrositing and site-specific conditions, the temporary disturbance area associated with turbine construction/decommissioning is approximately 17.3ha. ▪ Develop and implement a Blasting Plan, that might include, but will not be limited to: ▪ Blasting will only occur in areas that have already been cleared of vegetation; ▪ Where feasible, the construction footprint will be microsited to select areas where blasting is not required. ▪ No blasting will occur in wetland or open aquatic habitats; ▪ Blast mats will be used to control debris and sound generated from blasting;	*Residual effect on habitat change* • Effects on the habitat of bat SAR including possible damage or destruction of residences can be minimized provided recommended mitigation is implemented; however, some bat SAR habitat will be removed. No residual effects of habitat fragmentation are anticipated for bat SAR, given that these species will likely forage in newly created small opening in forest cover. *No residual effect on change in behaviour* • Effects on the behaviour of bat SAR due to artificial lighting at night can be mitigated provided construction and decommissioning activities occur during daylight hours. *Residual effect on change in mortality risk* • Increased mortality risk (including harm) to bat SAR can be minimized provided recommended mitigation is implemented; however, isolated bat SAR mortality is possible.

Table 6-4: Potential Effects, Proposed Mitigation Measures and Residual Effects – Construction / Decommissioning

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
			▪ Pre-blast species searches will be completed by a qualified Biologist prior to any blasting activity that occurs during the active period for snakes (April 15 to September 30). If a snake SAR is encountered during a pre-blast search, it will be relocated to an area of similar habitat at least 50 m, but less than 300 m, from the area proposed for blasting. In the highly unlikely event that similar habitat is not found within those parameters, the snake will be relocated to the next closest location of similar habitat; and ▪ Follow proper drilling, explosive handling and loading procedures. ▪ Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. ▪ Develop and implement a Sighting Response Protocol, in the Wildlife Management Plan which will include: ▪ Education of all on-site staff about SAR that may be encountered; ▪ Immediate stop in construction activity within 10 m of an observation of a SAR until a qualified Biologist can confirm the species has vacated the construction disturbance footprint. In lieu of calling a Biologist, work can be resumed after a 24 hr period if no evidence of the species exists within the immediate area of previous observation. If the species still exists within the immediate area after 24 hr, a qualified Biologist will be contacted to provide appropriate direction; ▪ For animals in immediate danger, handling procedures will be established for designated personnel (i.e., Environmental Monitor, qualified Biologist) in the event that a SAR needs to be moved out of potential harm; ▪ Maintain a species observation log to track species observations during the construction / decommissioning phase of the HIWEC so that adaptive management can be applied based on species concentrations; ▪ All required permits under Section 73(2) of *SARA* will be obtained prior to handling SAR; and ▪ Reporting procedures (e.g., frequency to HIFN and EC-CWS). ▪ Post SAR Fact Sheets in areas where on-site staff can become familiar with possible species encounters. ▪ The following mitigation measures will be implemented with respect to the Environmental Construction Monitor: ▪ An Environmental Monitor will be on site during all construction activities. ▪ Additional Environmental Monitors will be present during key construction activities including vegetation removal, dewatering and blasting, and as required to ensure compliance with environmental requirements. ▪ Environmental Construction Monitors will also complete daily, weekly and monthly monitoring of general and specific activities/measures (such as monitoring ecopassages and culverts to ensure that no debris is compromising their use, effectiveness of erosion and sedimentation control measures, fuel storage tanks etc. ▪ Environmental Construction Monitors will also keep daily logs of their activities and note any non-compliance issues. Any non-compliance issues will be provided to the General Contractor for immediate follow-up.	
Land and Resources Used for Traditional Purposes by Aboriginal Persons	• Site preparation • Construction of access roads and laydown areas • Transportation of equipment and materials (construction) • Foundation excavation and construction • WTG installation • Collector system and transmission line installation • Installation of TSs • Construction completion • Power connection and commissioning • Power disconnection and commissioning • Transportation of equipment and materials (decommissioning) • Disassembly and removal of collector system components • WTG and / or tower disassembly and removal • Disassembly and removal of O&M building infrastructure • Decommissioning completion	• Change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering.	• Develop a site policy for safety and permitted access within the HIWEC regarding Aboriginal traditional uses allowed on the site during construction / decommissioning, (e.g., a firearms and / or hunting policy). • HIWEC components sited based on feedback from the community through Aboriginal Traditional Knowledge and constraint discussions. • Continue existing access to Henvey Inlet. • Minimize clearing widths for access roads, collector lines, transmission lines and WTG areas to the area necessary for safe construction and operation of the HIWEC. • Initiate site reclamation of temporarily disturbed areas immediately following construction. • Mitigation measures proposed in under the Vegetation and Ecological Communities VEC, Wildlife and Wildlife Habitat VEC and Fish and Fish Habitat VEC to minimize loss of habitat and disturbance to wildlife will serve to further reduce impacts to HIFN traditional use activities.	*Residual effect on land and resources used for traditional purposes by Aboriginal persons* • Temporary change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering due to loss of habitat and disturbance to wildlife and vegetation species within the construction footprint. Land uses including hunting, trapping, fishing, plant gathering, boating and the use of seasonal and permanent residences can continue outside of the construction / decommissioning footprint.
		• Disturbance to current land users from construction / decommissioning noise and vibration.	• Limit construction activities to daylight hours. • Equip vehicles with effective muffler and exhaust systems. • Avoid unnecessary idling of engines. • Ensure that construction equipment is frequently maintained and kept in good working condition. • Ensure that noise emissions from construction equipment not exceed guidelines specified in MOECC publication NPC-115 and manufacturer recommendations. • Implement construction speed limit of 30 km/hr on all access roads. • Undertake blasting operations in accordance with applicable federal and provincial guidelines (Ontario Ministry of the Environment Guidelines on Information Required for the Assessment of Blasting Noise and Vibration, 1985). • Maintain ongoing communication with Bekanon Road residents, other HIFN members on HIFN I.R. #2 and other affected land users about construction timelines and activities. • If complaints arise from users, develop and maintain a reporting log, respond to complaint in a timely fashion and mitigate accordingly.	*Residual effect on land and resources used for traditional purposes by Aboriginal persons* • Disturbance to current land users can be mitigated be partially mitigated through standard mitigation measures for construction noise effects; however, some intermittent disturbance will remain through the construction and decommissioning phases.

Table 6-4: Potential Effects, Proposed Mitigation Measures and Residual Effects – Construction / Decommissioning

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
		• Reduced access to on-Reserve lands during construction / decommissioning	• Maintain ongoing communication with Bekanon Road residents, other HIFN members on HIFN I.R. #2 and other affected land users about construction / decommissioning timelines, activities and associated access limitations. • Maintain existing access Henvey Inlet throughout construction / decommissioning. • Access limitations will be confined to active construction areas. • Restricted areas to be clearly marked. • Develop access plans for authorized users during the construction / decommissioning period. • Install signage to notify authorized road users of construction / decommissioning activities, where appropriate. • If complaints arise from users, develop and maintain a reporting log, respond to complaint in a timely fashion and mitigate accordingly.	*Residual effect on land and resources used for traditional purposes by Aboriginal persons* • Reduced access will be confined to the active construction areas. Access to primary land uses including hunting, trapping, fishing, plant gathering, boating and the use of seasonal and permanent residences will be largely unaffected by construction / decommissioning activities. Some restricted access to active construction areas would remain.
Cultural Resources / Heritage and Archaeological Sites	• Site preparation • Construction of O&M building infrastructure • Construction of access roads and laydown areas • Foundation excavation and construction • Collector system and transmission line installation • WTG installation • Installation of TSs • Disassembly and removal of collector system components • WTG and / or tower disassembly and removal • Disassembly and removal of O&M building infrastructure	*Potential effects on archaeological resources* • Potential to impact archaeological resources during excavation activities.	• If unanticipated archaeological resources are uncovered during construction and decommissioning all activities must stop until an archaeologist can evaluate the situation and carry out any required assessment to preserve the archaeological information. Construction activities will not re-commence until any negative impacts to archaeological resources are mitigated either through fully excavating any archaeological sites and removing them from the ground, or by adjusting infrastructure placement to avoid archaeological sites. No archaeological resource will leave the site as it is the property of HIFN.	*No residual effects* • No effects to archaeological resources provided the resources are mitigated through excavation or avoidance.
		Potential direct and indirect effects on cultural heritage features • Potential to impact cultural heritage features during construction activities.	• Site HIWEC infrastructure to avoid cultural heritage features. • If unanticipated cultural heritage features are discovered during construction and decommissioning all activities must stop until an Archaeologist can evaluate the situation and carry out any required assessments. Construction activities will not re-commence until any negative impacts are mitigated.	*No residual effects* • No effects to cultural heritage features provided the HIWEC infrastructure is sited to avoid features.
Air Quality	• Site preparation • Construction of access roads and laydown areas • Transportation of equipment and materials (construction) • Foundation excavation and construction • WTG installation • Collector system and transmission line installation • Installation of TSs • Construction completion • Power connection and commissioning • Power disconnection and commissioning • Transportation of equipment and materials (decommissioning) • Disassembly and removal of collector system components • WTG and / or tower disassembly and removal • Disassembly and removal of O&M building infrastructure • Decommissioning completion	• Vehicle and equipment emissions contributing to a reduction in local air quality.	• Equip vehicles with effective exhaust systems. • Avoid unnecessary idling of engines. • Ensure that construction equipment is frequently maintained and kept in good working condition.	*No residual effects* • Emissions from construction activities are not anticipated to result in a measureable increase in local or regional air quality parameters.
		• Dust generation from vehicle use and construction activity contributing to a reduction in local air quality.	• Implement construction speed limit of 30 km/hr on all access roads. • Conduct dust suppression (i.e., spraying water on access roads and work areas) during dry conditions to minimize dust generation. • If complaints arise, develop and maintain a reporting log, respond to complaint in a timely fashion and mitigate accordingly.	*No residual effects* • Emissions from construction activities are not anticipated to result in a measureable increase in local or regional air quality parameters.

Table 6-4: Potential Effects, Proposed Mitigation Measures and Residual Effects – Construction / Decommissioning

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
Local Residents, Cottagers and Businesses	• Site preparation • Construction of access roads and laydown areas • Transportation of equipment and materials (construction) • Foundation excavation and construction • WTG installation • Collector system and transmission line installation • Installation of TSs • Construction completion • Power disconnection and commissioning • Transportation of equipment and materials (decommissioning) • Disassembly and removal of collector system components • WTG and / or tower disassembly and removal • Disassembly and removal of O&M building infrastructure • Decommissioning completion	• Disturbance to local residents, cottagers and businesses from construction / decommissioning noise and vibration.	• Mitigation for disturbance to local residents, cottagers and businesses due to construction / decommissioning noise and vibration is considered under the Land and Resources Used for Traditional Purposes by Aboriginal Persons VEC.	*Residual effect on local resident, cottagers and businesses* • Disturbance to local residents, cottagers and businesses can be minimized through standard mitigation measures for construction noise effects; however, some intermittent disturbance may remain through the construction and decommissioning phases.
		• Reduced access to HIFN I.R. #2 by Aboriginal and non-Aboriginal residence/cottage owners on I.R. #2.	• Maintain existing access to Henvey Inlet, throughout construction/ decommissioning. • Access limitations will be confined to active construction areas. • Work restricted areas to be clearly marked. • Develop access plans for authorized users during the construction / decommissioning period. • Install signage to notify authorized road users of construction / decommissioning activities, where appropriate.	*No residual effect.* • Reduced access is not anticipated since construction and decommissioning activity will not affect access primary use areas for recreation and tourism such as Henvey Inlet, Georgian Bay and Key River.
Recreation and Tourism	• Site preparation • Construction of access roads and laydown areas • Transportation of equipment and materials (construction) • Foundation excavation and construction • WTG installation • Collector system and transmission line installation • Installation of TSs • Construction completion • Power disconnection and commissioning • Transportation of equipment and materials (decommissioning) • Disassembly and removal of collector system components • WTG and / or tower disassembly and removal • Disassembly and removal of O&M building infrastructure • Decommissioning completion	• Avoidance of overnight accommodations and recreational activities near the HIWEC due to noise and vibration.	• Mitigation for avoidance of overnight accommodations and recreational activities near the HIWEC due to noise and vibration is considered under the Land and Resources Used for Traditional Purposes by Aboriginal Persons VEC.	*Residual effect on recreation and tourism* • Avoidance of overnight accommodations and recreational activities near HIWEC is not anticipated. Noise and vibration disturbance can be partially mitigated through standard mitigation measures for construction noise effects; however, some disturbance may remain through the construction and decommissioning phases.
Community Services and Infrastructure	• Transportation of equipment and materials	• Increase in truck traffic where the south access road crosses Bekanon Road.	• Prohibit construction vehicles (including personal vehicles) from travelling along Bekanon Road, except to cross Bekanon Road, wherever possible. • Notify HIFN in advance of construction delivery schedules and install signage to notify road users of construction activity, where appropriate.	*Residual effect on traffic* • Construction vehicles will not be permitted to travel along Bekanon Road, wherever possible; however, some residual traffic effects may occur intermittently where the south access road crosses Bekanon Road throughout the construction period.
	• Construction of access roads and laydown areas • Foundation excavation and construction	• Potential disruption to local water supply wells from construction activity.	• Mitigation measures proposed under the Groundwater VEC will be followed and include: ▪ Undertake blasting operations and pile driving in accordance with relevant federal and provincial guidelines and standards. ▪ Develop and implement a Blasting Plan that includes standard BMPs to minimize extent of adverse noise and vibration from blasting (also refer to mitigation measures for "*Reduction in soil quality and / or quantity due to erosion, sedimentation and compaction resulting from excavation, blasting, use of heavy equipment on exposed soils and stockpiling of cleared materials*" under the Soils and Terrain VEC for a list of proposed blasting BMPs). ▪ In the event an impact to private water well is detected the well owner will be provided with a potable supply of water and maintain the supply until water quality conditions are comparable to baseline conditions. In the event water quality does not recover to baseline conditions, the impacted well will be modified (i.e., deepened) or a new well be constructed that is sufficient to provide the resident with a potable supply of water similar in quantity and quality of baseline conditions.	*Residual effect on local water supply wells* • Reduction in groundwater quality (turbidity) and quantity would be minimized through the development and implementation of a Blasting Plan; however, a disturbance to the subsurface resulting in a temporary reduction in groundwater quality and / or quantity may remain. • In the unlikely event of physical damage to ground-water supply wells appropriate mitigation to the affected well owner will ensure effects are minimal. • See the Groundwater VEC for residual effects on water supply wells from construction activity.

Table 6-5: Potential Effects, Proposed Mitigation Measures and Residual Effects – Operations

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
Soils and Terrain	• WTG, collector system / on-Reserve transmission, road and crossing repair / maintenance	*Changes to soil quality* • Reduction in soil quality due accidental release of contaminants.	• Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals and to avoid soil contamination. This plan will include, for example: ▪ Protocols for access to spill control and containment equipment / materials (e.g., ensure that spill control and containment equipment / materials are readily available on-site and additional spill clean-up materials will be available if needed, restock materials contained in spill clean-up kits as necessary). ▪ Protocols for handling contaminated materials (i.e., to be handled in accordance with relevant federal and provincial guidelines and standards). ▪ MSDS which provides information on proper handling of chemicals readily available for the types of chemicals that will be used on-site. ▪ Training requirements for operational staff on associated emergency response plan and spill clean-up procedures. ▪ Protocols for cleaning up spills (i.e., clean up spills as soon as possible, with contaminated soils removed to a licenced disposal site, if required; analyze any soil encountered during operations that has visual staining or odours, or contains rubble, debris, cinders or other visual evidence of impacts to determine its quality in order to identify the appropriate disposal method). ▪ Reporting procedures to meet federal, provincial and local requirements (e.g., reporting spills and verification of clean-up), emergency contact and HIWEC management phone numbers. • Apply the following general mitigation measures to avoid soil contamination: ▪ Ensure machinery is maintained free of fluid leaks. ▪ Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done on spill pads in specified areas at least 30 m away from wetlands and / or waterbodies. ▪ Store any stockpiled materials at least 30 m away from wetlands and / or waterbodies. ▪ Store any potential contaminants (e.g., oil, fuels and chemicals) in designated areas using secondary containment, where necessary. ▪ All potentially hazardous materials to be stored in containment sites within the O&M building, within berms where possible. ▪ Keep ROW for access roads, collector lines /on-Reserve transmission lines and WTGs clear of garbage and debris.	*Residual effect on soil quality* • Reduction in soil quality due to accidental release of contaminants during operations would be minimized following implementation of mitigation measures; however, residual contaminants may remain in some areas of the HIWEC.
Groundwater	• Physical presence of WTG and roads	*Changes to groundwater quantity* • Reduction in groundwater recharge quantities due to increases in impervious surfaces (e.g., WTG foundations, access roads and buildings) and changes to infiltration and surface runoff patterns.	• Apply mitigation measures to increase groundwater infiltration, as described in the **Construction and Decommissioning Effects and Mitigation Table 6-4** during the design and construction phase.	*Residual effect on groundwater quantity* • Reduction in groundwater recharge quantities due to increases in impervious surfaces and changes to infiltration and surface runoff patterns would be minimized following implementation of mitigation measures; however, the creation of impervious surface (i.e., paved parking lots, compressed gravel roads, WTG foundations and buildings) is not completely avoidable and therefore some reduction in groundwater recharge may remain.
	• WTG, collector system / on-Reserve transmission, road and crossing repair / maintenance	*Changes to groundwater quality* • Reduction in groundwater quality due to accidental contaminant spills, vehicle and machinery operation.	• Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals or to avoid contamination of adjacent waterbodies and train staff on associated procedures. • Apply the following general mitigation measures to avoid soil and / or water contamination: ▪ Ensure machinery is maintained free of fluid leaks. ▪ Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done in specified areas at least 30 m away from wetlands, woodlands and / or waterbodies. ▪ Store any stockpiled materials at least 30 m away from wetlands and / or waterbodies. ▪ Store any potential contaminants (e.g., oil, fuels and chemicals) in designated areas using secondary containment, where necessary. • Also refer to mitigation measures for "*Reduction in soil quality due accidental release of contaminants during operation, etc.*" for additional proposed mitigation measures.	*Residual effect on groundwater quality* • Reduction in groundwater quality due to accidental contaminant spills, vehicle and machinery operation during operations would be minimized through the implementation of a Spill Prevention and Response Plan and other mitigation measures; however, residual contaminants may remain in some areas of the HIWEC.
Wildlife and Wildlife Habitat (including Species of Conservation Concern)	• HIWEC operation • WTG, collector system, road and water crossing repair / maintenance • Environmental monitoring	*Change in mortality risk* • Possible bat and bird mortality as a result of collision with WTGs.	• Utilize a lighting scheme that will minimize potential risks for bat and bird collisions, while fulfilling Transport Canada requirements. Consider design solutions to minimize lighting. • Develop and implement a follow-up and monitoring plan as per EC guidelines which includes a post-construction bird and bat mortality and disturbance monitoring program consistent with *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (EC-CWS, 2007a) and *Wind Turbines and Birds A Guidance Document for Environmental Assessment* (EC-CWS, 2007b). • Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis. • Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring.	*Residual effect for change in mortality risk* • Increase in mortality risk to birds and bats can be minimized provided recommended mitigation is implemented; however, some mortality of birds and bats as a result of collisions with WTGs is anticipated.

Table 6-5: Potential Effects, Proposed Mitigation Measures and Residual Effects – Operations

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
		Change in behaviour • Disturbance to wildlife caused by noise and light from operating WTGs and other infrastructure, and possible avoidance of the area.	• Utilize a lighting scheme that will minimize disturbance to wildlife, while fulfilling Transport Canada requirements. Consider design solutions to minimize lighting. • Develop and implement a follow-up and monitoring plan which includes a post-construction disturbance effects monitoring program to confirm continued use of wildlife habitat following pre-construction monitoring approaches where appropriate. • Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis. • Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring.	*Residual effect for change in behaviour* • Effects on the behaviour of wildlife can be minimized provided recommended mitigation is implemented; however, some wildlife may exhibit changes in behaviour during operations.
		Change in mortality risk • Possible bird and bat mortality as result of vegetation removal during routine maintenance of the overhead collector lines, on-Reserve transmission line and other HIWEC infrastructure.	• Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Vegetation trimming will be limited to within areas that have been previously cleared during construction. • Schedule trimming of any necessary vegetation removal during routine maintenance activities to occur outside of the overall bird nesting season, from April 1 to August 31 (EC, 2014b). If this is not possible, the following mitigation will apply, in accordance with the *MBCA* and the Wildlife Management Plan: ▪ Conduct nest and nesting activity surveys by a qualified Avian Biologist immediately prior to vegetation maintenance. ▪ If an active nest or confirmed nesting activity is found, a buffer area will be implemented around the nest or nesting activity. The radius of the buffer will range depending on the species, level of disturbance and landscape context which will be confirmed by a qualified Avian Biologist (EC, 2014b). The nest itself will not be marked using flagging tape or other similar material as this increases the risk of nest predation; however, the outer limits of the buffer can be marked (EC, 2014b) and UTM coordinates will be taken. • If suitable cavity trees must be removed during the bat roosting season (April 30 to September 1), each cavity tree will be searched for signs of maternity roosts by a qualified Biologist prior to removal. If an active maternity roost is found, removal activities will be scheduled after the bat roosting season (April 30 to September 1). Any hazard tree, such as a tree which poses an immediate safety risk to individuals and / or a risk to the functionality of HIWEC equipment, is identified, the tree may be removed at any time through consultation with EC-CWS. The need for additional mitigation measures or permits in these circumstances will be addressed on a site-specific basis.	*Residual effect for change in mortality risk* • Increase in mortality risk to birds and bats can be minimized provided recommended mitigation is implemented; however, isolated mortality as a result of vegetation removal during maintenance activities is possible.
		Change in mortality risk • Possible mortality of wildlife as result of vehicles using access roads and maintenance of access roads.	• Maintain speed limit signage (30 km/hr) and speed bumps installed along access roads and instruct all staff to be vigilant for wildlife while driving on site. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Restrict public use of access roads to minimize risk of road mortality and poaching through installation of access gate with operations staff throughout the site. • Avoid grading as part of access road maintenance during the turtle nesting / hatching period (June 1 to September 15; GBBR, n.d.). • Avoid maintenance of culverts where substrates at or below the frost line are disturbed during the reptile winter hibernation period (October 15 to April 30; GBBR, n.d.) to the extent possible where suitable hibernation habitat within wetlands or aquatic features has been identified for reptiles. If this is not possible, and under emergency circumstances, a contingency mitigation strategy in the Wildlife Management Plan will be developed which will include: ▪ A qualified Biologist will be on site monitoring emergency maintenance activities should any hibernating snakes or turtles be found; and ▪ In the case a reptile is disturbed and brought out of hibernation, the individual will be transported immediately to the nearest trauma centre. • Avoid driving on access roads in proximity to amphibian breeding habitats at night between April 1 and June 30, and any rainy nights from spring to early autumn, wherever possible. • During the breeding bird season (April 1 to August 31), all maintenance and biological crews (which will encompass the vast majority of vehicle traffic on access roads) will consist of two people, one of which will be trained to scan for birds that may be on the road, and will use binoculars (when appropriate). The trained wildlife spotter will continually scan the access road ahead of the vehicle to ensure no birds are roosting or nesting on the road or shoulder.	*Residual effect for change in mortality risk* • Increase in mortality risk to wildlife can be minimized provided recommended mitigation is implemented; however, isolated wildlife mortality as a result of vehicles using access roads may occur.
		Change in mortality risk • Possible bird mortality as a result of collision with overhead collector lines and on-Reserve transmission lines.	• Bird diverters / anti-perching devices should be considered in areas of concentrated bird nests (i.e., Osprey and other raptor nests) along the on-Reserve transmission line to minimize potential collisions.	*Residual effect for change in mortality risk* • Increase in mortality risk to birds can be minimized provided recommended mitigation is implemented; however, isolated mortality as a result of collisions with overhead collector lines or the transmission line may occur.

Table 6-5: Potential Effects, Proposed Mitigation Measures and Residual Effects – Operations

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
Vegetation and Ecological Communities	• WTG, collector system, road and water crossing repair / maintenance • Environmental monitoring	*Change in species diversity,* *Change in community diversity* *Change in wetland quantity and function* • Introduction of invasive species.	• If encroachment of invasive species is detected, management recommendations will be determined by a qualified Biologist. • Vegetation trimming will be limited to within areas that have been previously cleared during construction.	*Residual effect for change in species diversity* • Effects of invasive species introductions on species diversity can be minimized provided recommended mitigation is implemented; however, temporary changes in species diversity may occur. *Residual effect for change in community diversity* • Effects of invasive species introductions on community diversity can be minimized provided recommended mitigation is implemented; however, temporary changes in community diversity may occur. *Residual effect for change in wetland quantity and function* • Effects of invasive species introductions on wetland quantity and function can be minimized provided recommended mitigation is implemented; however, temporary changes in wetland quantity or function may occur.
		Change in wetland quantity and function • Risk of accidental soil or water contamination from oil, gas, etc. during maintenance activities.	• Refer to mitigation measures for *"Reduction in soil quality due to accidental release of contaminants during operation, etc."* under the Soils and Terrain VEC.	*No residual effects.* • Changes in wetland quantity and function can be mitigated provided a Spill Prevention and Response Plan is developed and implemented.
Surface Water	• WTG operation • WTG, collector system, road and crossing repair / maintenance • Environmental Monitoring	*Changes to surface water quality* • Potential effects on surface water quality due to contaminant spills, dust and emissions from maintenance vehicles and equipment and maintenance / repair of water crossings.	• **Equipment Use** ▪ In order to avoid compacting or hardening of natural ground surface, and to avoid movement of machinery on sensitive slopes, restrict equipment to designated controlled vehicle access routes and to within identified work areas. ▪ Ensure machinery is maintained free of fluid leaks. ▪ Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done in specified areas at least 30 m away from wetlands and waterbodies. ▪ Use and maintain emission control devices on motorized equipment (as provided by the manufacturer of the equipment) to minimize the emissions so that they remain within industry standards. Heavy equipment and machinery to be used within operating specifications. ▪ Run vehicles and equipment only when necessary (i.e., limit idling). • **Water Quality** ▪ Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals or to avoid contamination of adjacent waterbodies and train staff on associated procedures. ▪ Turbid water shall not be discharged to a waterbody or wetland. ▪ Vegetation management will be done using mechanical techniques rather than herbicides. ▪ Whenever possible, operate machinery from outside the waterbody and on land above the high water mark or on ice in a manner that minimizes disturbance to the banks and bed of the waterbody. ▪ Limit machinery fording (if required) to only the amount necessary and only outside of sensitive time periods and upon consultation with a qualified environmental monitor. If repeated fording of the watercourse is required, construct a temporary crossing structure (e.g., jersey bridge, swamp mats). ▪ Dust will be suppressed using water as a suppressant, if required. • **Spills** • Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals or to avoid contamination of adjacent waterbodies and train staff on associated procedures. • Apply the following general mitigation measures to avoid soil or water contamination: ▪ Ensure machinery is maintained free of fluid leaks. ▪ Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done in specified areas at least 30 m away from natural features (wetlands, woodlands and wildlife habitats) or waterbodies. ▪ Store any stockpiled materials at least 30 m away from wetlands, woodlands, wildlife habitats, or waterbodies. • Store any potential contaminants (e.g., oil, fuels and chemicals) in designated areas using secondary containment, where necessary.	*Residual effect on surface water quality* • Effects on surface water quality during maintenance can be minimized provided a Spill Prevention and Response Plan is developed and implemented, however, some minor effects may remain due to limitations in current spill clean-up processes.

Table 6-5: Potential Effects, Proposed Mitigation Measures and Residual Effects – Operations

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
	• Operation of culverts at road crossings	*Changes to surface water quantity* • Potential for obstruction of lateral flows in waterbodies due to design of water crossing structures and debris build-up at watercourses.	• **Water Crossing Maintenance** ▪ Regular inspection of water crossing structures to confirm high and low flow of waterbody are accommodated. ▪ Regular inspection for debris buildup and / or obstruction of flow, and maintenance of such if required.	*No residual effects* • Effects minimized by proper culvert sizing and maintenance.
Fish and Fish Habitat	• WTG, collector system, road and crossing repair / maintenance • Environmental Monitoring	*Changes to fish habitat* • Potential for effects on aquatic biota and habitat due to contaminant spills, dust and emissions from maintenance vehicles and equipment.	• **Equipment Use (see above)** • **Water Quality (see above)** • **Spills (see above)**	*Residual effect on fish habitat* • Effects on aquatic biota and habitat due to dust from maintenance vehicles may be minimized following effective mitigation, however, equipment use on access roads may cause minor sedimentation into waterbodies. • Effects on fish and aquatic biota habitat due to spills are minimized following effective mitigation and implementation of a Spill Prevention and Response Plan, however, some minor effects may remain due to limitations in current spill clean-up processes.
	• Replacement and maintenance of culverts at road crossings	*Changes to fish habitat* • Potential for obstruction of fish passage in waterbodies due to design of replacement water crossings and debris build-up at watercourses.	• **Water Crossing Design** ▪ Design culverts installed at waterbodies supporting direct fish habitat to facilitate fish passage. ▪ Design culverts to accommodate high and low flows of the watercourse. • **Timing Windows** ▪ Time in-water work to avoid sensitive life stages of fish species (i.e., spawning), as follows: ▪ No in-water work from October 1 to July 15 ▪ WB-N-M4-59 ▪ No in-water work from March 15 to July 15 ▪ WEC North (WB-N-M32-14, WB-N-M6-3, WB-N-M12-12-2, WB-N-M12-12, WB-N-M26-21, WB-N-M26-31, WB-N-M28-16, WB-N-M35-1, WB-A-M3-3); ▪ WEC South (WB-S-M17-29, WB-S-M30-11, WB-S-M39-8, WB-S-M19-6, WB-S-M34-53, WB-S-M13-13) • **Monitoring** ▪ Monitor all in-water work to ensure mitigation is applied and to identify any disturbances to fish habitat. ▪ Document any changes resulting from construction activities and obtain photographic documentation.	*Residual effect on fish habitat* • Obstruction of fish passage through blocked water crossings on access roads prior to maintenance of- and during replacement of-access road crossings will be minimized by proper culvert sizing and adherence to timing windows for maintenance activities in-water; however, some change to fish habitat will remain at localized areas associated with maintenance.
Species at Risk	• HIWEC operation • WTG, collector system, road and water crossing repair / maintenance • Environmental monitoring	*Change in behaviour, due to disturbance of SAR* *Change in mortality risk (including harm, harassment and / or killing of SAR)* <u>Avian Species at Risk</u> Canada Warbler (*Cardellina pusilla*) Common Nighthawk (*Chordeiles minor*) Kirtland's Warbler (*Setophaga kirtlandii*) Olive-sided Flycatcher (*Contopus borealis*) Whip-poor-will (*Caprimulgus vociferous*)	• Utilize a lighting scheme that will minimize potential risks for bird collisions, while still fulfilling Transport Canada requirements. Lighting scheme to include the following, where possible, while still fulfilling minimum Transport Canada requirements: ▪ Implement red LED flashing lights on turbines, ▪ Light turbines and permanent met/communication towers to the minimum federal standards, ▪ Ground-level lights (i.e. buildings, turbine bases, etc.) will be directed downward and shall use motion or heat sensors where practical and allowed by applicable codes and the authority having jurisdiction, ▪ Use of high-intensity lighting or spotlights, if required, will be temporary and will be kept to a minimum, • Any internal nacelle lighting will only be used when occupied.Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Implement a proactive approach to feathering WTG blades below the manufacturer's recommended cut-in speed. Feathering refers to the act of pitching turbine blades by 90°, parallel to the wind or turning the turbine naecelle so that the blades are facing away from the wind. • Vegetation trimming will be limited to areas that have been previously cleared during construction. • Schedule trimming of any necessary vegetation removal during routine maintenance activities to occur outside of the overall bird nesting season, from April 1 to August 31 (EC, 2014b). If this is not possible (e.g., hazard tree), the following mitigation will apply, in accordance with the *MBCA* and the Wildlife Management Plan: ▪ Conduct nest and nesting activity surveys by a qualified Avian Biologist immediately prior to vegetation maintenance. ▪ Within complex habitats*, removal of all vegetation is proposed to occur outside the core bird nesting season of May 1 to July 28, when a minimum of 60% of nesting activity occurs in each of the 3 habitat types, as per Environment Canada's Nesting Calendar for Zone C3 (Environment Canada 2014d), ▪ Nest surveys will be conducted in areas defined as simple habitat* immediately prior to vegetation clearing. ▪ If an active nest or confirmed nesting activity is found, a buffer area will be implemented around the nest or nesting activity. The radius of the buffer will range depending on the species, level of disturbance and landscape context which will be confirmed by a qualified Avian Biologist (EC, 2014b). This minimum buffer is expected to provide protection of the nest from nearby activities, such as vegetation clearing and heavy machinery or vehicle operation.	*Residual effect on change in behaviour* • Effects on the behaviour of bird SAR can be minimized provided recommended mitigation is implemented; however, some bird SAR may exhibit avoidance behaviour during operations. *Residual effect for change in mortality risk* • Increase in mortality risk to bird SAR can be minimized provided recommended mitigation is implemented; however, isolated mortality of bird SAR is possible as a result of collisions with WTGs and maintenance activities.

Table 6-5: Potential Effects, Proposed Mitigation Measures and Residual Effects – Operations

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
			▪ The nest itself should never be marked using flagging tape or other similar material as this increases the risk of nest predation; however, the outer limits of the buffer can be marked (EC, 2014b) and UTM coordinates will be taken. ▪ Any hazard tree, such as a tree which poses an immediate safety risk to individuals and / or a risk to the functionality of HIWEC equipment, is identified, the tree may be removed at any time through consultation with EC-CWS. The need for additional mitigation measures or permits in these circumstances will be addressed on a site-specific basis. • Clearly post speed limit signs along access roads (30km/hr), install speed bumps within areas of concentrated wildlife activity and instruct all staff to be vigilant for wildlife while driving on site. • During the breeding bird season (April 1 to August 31), all maintenance and biological crews (which will encompass the vast majority of vehicle traffic on access roads) will consist of two people, one of which will be trained to scan for SAR birds that may be on the road, and will use binoculars (when appropriate). The trained wildlife spotter will continually scan the access road ahead of the vehicle to ensure no SAR birds are roosting or nesting on the road or shoulder. If a SAR bird is identified on the road, the vehicle will immediately stop and will continue around the bird at a very low speed (e.g. less than 5 km/h), if there is enough room to safely proceed. • Post SAR Fact Sheets in areas where on-site staff can become familiar with species that may be encountered. • Develop and implement a follow-up and monitoring plan as per EC guidelines which includes a post-construction bird and bat mortality and disturbance monitoring program consistent with *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (EC-CWS, 2007a) and *Wind Turbines and Birds A Guidance Document for Environmental Assessment* (EC-CWS, 2007b). • Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis. • Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring. • Report confirmed Species at Risk mortalities during post-construction monitoring to HIFN and EC-CWS within 48hrs of a confirmed species identification. **Note: Complex habitats refer to habitats that contain a variety of individual nesting sites in a range of habitats. For instance, forest and shrub-dominated communities may contain nesting spots within the canopy, sub-canopy, shrub layer and ground layer, where identification of active nests may be difficult. Simple habitats refer to habitats that contain few likely nesting spots or a homogenous community where identification of active nests can be completed with confidence. For instance, open rock barrens or other sparsely vegetated habitats may be considered simple habitats, depending on site-specific vegetation cover.*	
		Change in behaviour *Change in mortality risk (including harm, harassment and / or killing of SAR)* <u>Turtle Species at Risk</u> Blanding's Turtle (*Emydoidea blandingii*) Eastern Musk Turtle (*Sternotherus odoratus*)	• Periodically monitor (once in early spring after snow melt and once in summer/fall) to determine if any maintenance or repair is required at all installed ecopassages and repair accordingly to allow for movement corridors in areas where high turtle activity has been identified in order to limit road mortality. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Avoid grading as part of access road maintenance during the turtle nesting / hatching period (June 1 to September 15; GBBR, n.d.). If there are serious safety concerns or other circumstances where road maintenance may be required during this period, EC-CWS will be consulted prior to the activity taking place. • Avoid maintenance of culverts where substrates at or below the frost line are disturbed during the reptile winter hibernation period (October 15 to April 30; GBBR, n.d.) to the extent possible where suitable hibernation habitat within wetlands or aquatic features has been identified for reptiles. If this is not possible, and under emergency circumstances, a contingency mitigation strategy in the Wildlife Management Plan, will be developed and include: ▪ A qualified Biologist will be on site monitoring emergency maintenance activities should any hibernating turtle SAR be found; and ▪ In the case a turtle is disturbed and brought out of hibernation, the individual will be transported immediately to the nearest turtle trauma centre. • Maintain speed limit (30 km/hr) and wildlife crossing signs, and speed bumps installed along access roads and instruct all staff to be vigilant for wildlife while driving on site. • Post SAR Fact Sheets in areas where on-site staff can become familiar with species that may be encountered. • Restrict public use of access roads to minimize risk of road mortality and poaching through installation of access gate with operations staff throughout the site. It is the intent of Henvey Inlet First Nation (HIFN) to regulate the use of HIWEC and HIFN I.R. #2 by members of HIFN and non-members. Gates will be installed at the entrances to the Project site and patrolling will be conducted. Currently, the site is monitored by HIFN and the Ministry of Natural Resources and Forestry. • During the active turtle period (April 15 – September 30), all maintenance and biological crews (which will encompass the vast majority of vehicle traffic on access roads) will consist of two people, one of which will be trained to scan for SAR turtles that may be on the road. The trained wildlife spotter will use binoculars (when appropriate) and will continually scan the access road ahead of the vehicle to ensure no SAR turtles are near or on the road. If a SAR turtle is identified on	• *Residual effect on change in behaviour* • Effects on the behaviour of turtle SAR can be minimized provided recommended mitigation is implemented; however, some turtle SAR may alter nest site selection along access roads. *Residual effect on change in mortality risk* • Increase in mortality risk to turtle SAR can be minimized provided recommended mitigation is implemented; however, isolated mortality of turtle SAR may occur as a result of vehicular traffic on access roads and maintenance activities.

Table 6-5: Potential Effects, Proposed Mitigation Measures and Residual Effects – Operations

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
			the road, the vehicle will immediately be stopped and will continue around the turtle at a very low speed (e.g. less than 5 km/h), if there is enough room to safely proceed. All measures will be taken to ensure the safety of the turtle, which may include moving the turtle to a safe location off the road, and keeping vehicles at a safe distance to limit influence on natural movement behaviour. • Road mortality surveys will be conducted twice a week from May 1 to October 31 during the operational phase to monitor the effectiveness of ecopassages/designated movement corridors and turtle mortality rates. This monitoring period encompasses the period when the most vehicle activity will occur on site, albeit still relatively low traffic is expected. • If analysis of road mortality surveys, as well as Species Encounter Reports, indicate high road mortality in specific areas, consideration will be given to closing specific access road segments to all non-essential vehicular traffic. Essential vehicular traffic will include any traffic required to meet permitting obligations or maintain infrastructure in good working order. The duration of access road closure will be determined by a qualified Biologist and will be based on the specific circumstances under which the impact has occurred. • Develop and implement a Sighting Response Protocol in the Wildlife Management Plan which will include: ▪ Education of all on-site staff about SAR that may be encountered; ▪ For animals in immediate danger, handling procedures will be established for site personnel in the event that a SAR needs to be moved out of potential harm (i.e. off a road); ▪ Maintain a species observation log to track species observations during the operational phase of the project so that adaptive management can be applied based on species concentrations; ▪ All required permits under Section 73(2) of SARA will be obtained prior to handling SAR.	
		Change in behaviour *Change in mortality risk (including harm, harassment and / or killing of SAR)* <u>Snake Species at Risk</u> Eastern Foxsnake (Georgian Bay population) (*Pantherophis gloydi pop. 1*) Eastern Hog-nosed Snake (*Heterodon platirhinos*) Massasauga Rattlesnake (Great Lakes / St. Lawrence population) (*Sistrurus catenatus pop. 1*)	• Periodically monitor (once in early spring after snow melt and once in summer/fall) to determine if any maintenance or repair is required at all installed ecopassages and repair accordingly to allow for movement corridors in areas where high turtle activity has been identified in order to limit road mortality. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Maintain speed limit 30 km/hr) and wildlife crossing signs, and speed bumps installed along access roads and instruct all staff to be vigilant for wildlife while driving on site. • Avoid maintenance of culverts where substrates at or below the frost line are disturbed during the reptile winter hibernation period (October 15 to April 30; GBBR, n.d.) to the extent possible where suitable hibernation habitat within wetlands or aquatic features has been identified for reptiles. If this is not possible, and under emergency circumstances, a contingency mitigation strategy in the Wildlife Management Plan will be developed and include: ▪ A qualified Biologist will be on site monitoring emergency maintenance activities should any hibernating SAR be found; and ▪ In the case a snake is disturbed and brought out of hibernation, the individual will be transported immediately to the nearest trauma centre. • Post SAR Fact Sheets in areas where on-site staff can become familiar with species that may be encountered. • In the rare instance a snake is encountered and must be relocated, a qualified Biologist / Handler will be contacted to move the snake a safe distance away in appropriate habitat. • Restrict public use of access roads to minimize risk of road mortality and poaching through installation of access gate with operations staff throughout the site. It is the intent of Henvey Inlet First Nation (HIFN) to regulate the use of HIWEC and HIFN I.R. #2 by members of HIFN and non-members. Gates will be installed at the entrances to the Project site and patrolling will be conducted. Currently, the site is monitored by HIFN and the Ministry of Natural Resources and Forestry. • During the active snake period (April 15 – September 30), all maintenance and biological crews (which will encompass the vast majority of vehicle traffic on access roads) will consist of two people, one of which will be trained to scan for SAR snakes that may be on the road. The trained wildlife spotter will use binoculars and continually scan the access road ahead of the vehicle to ensure no SAR snakes are on or near the road. If a SAR snake is identified on the road, the vehicle will immediately be stopped and will continue around the snake at a very low speed (e.g. less than 5 km/h), if there is enough room to safely proceed. All measures will be taken to ensure the safety of the snake, which may include moving the snake to a safe location off the road and keeping vehicles at a safe distance to limit influence on natural movement behaviour. • Road mortality surveys will be conducted twice a week from May 1 to October 31 during the operational phase to monitor the effectiveness of ecopassages/designated movement corridors and turtle mortality rates. This monitoring period encompasses the period when the most vehicle activity will occur on site, albeit still relatively low traffic is expected during summer months.	*Residual effect on change in behaviour* • Effects on the behaviour of snake SAR can be minimized provided recommended mitigation is implemented; however, some snake SAR may alter basking site selection along access roads. *Residual effect on change in mortality risk* • Increase in mortality risk to snake SAR can be minimized provided recommended mitigation is implemented; however, isolated mortality of snake SAR is possible as a result of vehicular traffic on access roads and maintenance activities.

Table 6-5: Potential Effects, Proposed Mitigation Measures and Residual Effects – Operations

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
			• If analysis of road mortality surveys, as well as Species Encounter Reports, indicate high road mortality in specific areas, consideration will be given to closing specific access road segments to all non-essential vehicular traffic. Essential vehicular traffic will include any traffic required to meet permitting obligations or maintain infrastructure in good working order. The duration of access road closure will be determined by a qualified Biologist and will be based on the specific circumstances under which the impact has occurred. • Develop and implement a Sighting Response Protocol in the Wildlife Management Plan which will include: ▪ Education of all on-site staff about SAR that may be encountered; ▪ For animals in immediate danger, handling procedures will be established for site personnel in the event that a SAR needs to be moved out of potential harm (i.e. off a road); ▪ Maintain a species observation log to track species observations during the operational phase of the project so that adaptive management can be applied based on species concentrations; and ▪ All required permits under Section 73(2) of SARA will be obtained prior to handling SAR.	
		Change in behaviour, due to disturbance of SAR *Change in mortality risk (including harm, harassment and / or killing of SAR)* <u>Bat Species at Risk</u> Little Brown Bat (*Myotis lucifugus*) Northern Myotis Bat (*Myotis septentrionalis*) Tri-colored Bat (*Perimyotis subflavus*)	• Utilize a lighting scheme that will minimize continuous lighting and the use of bright lights throughout the Project Area to minimize attraction of SAR bats to lit structures (Rydell 1991). Lighting scheme to include the following, where possible, while still fulfilling minimum Transport Canada requirements: ▪ Implement red LED flashing lights on turbines; ▪ Light turbines and permanent met/communication towers to the minimum federal standards; ▪ Ground-level lights (i.e. buildings, turbine bases, etc.) will be directed downward and shall use motion or heat sensors where practical and allowed by applicable codes and the authority having jurisdiction; ▪ Use of high-intensity lighting or spotlights, if required, will be temporary and will be kept to a minimum; and ▪ Any internal nacelle lighting will only be used when occupied. • Implement a proactive approach to feathering turbine blades below the manufacturer's recommended cut-in speed. Feathering refers to the act of pitching turbine blades by 90°, parallel to the wind or turning the turbine naecelle so that the blades are facing away from the wind. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Vegetation trimming will be limited to areas that have been previously cleared during construction. Schedule trimming of any necessary vegetation removal during routine maintenance activities to occur outside of the overall bat roosting season, from April 30 to September 1. If suitable cavity trees must be removed during the bat roosting season (April 30 to September 1), each cavity tree will be searched for signs of maternity roosts by a qualified Biologist prior to removal. If an active maternity roost is found, removal activities will be scheduled after the bat roosting season (April 30 to September 1) or once a qualified biologist has confirmed the tree is no longer being actively used as a roost. • Any suitable hazard tree, such as a tree which poses an immediate safety risk to individuals and / or a risk to the functionality of HIWEC equipment, is identified, the tree may be removed at any time through consultation with EC-CWS. The need for additional mitigation measures or permits in these circumstances will be addressed on a site-specific basis. • Develop and implement a follow-up and monitoring plan as per EC guidelines which includes a post-construction bird and bat mortality and disturbance monitoring program consistent with *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (EC-CWS, 2007a) and *Wind Turbines and Birds A Guidance Document for Environmental Assessment* (EC-CWS, 2007b). • Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis; • Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring; • Report confirmed Species at Risk mortalities during post-construction monitoring to HIFN and EC-CWS within 48hrs of a confirmed species identification.Post SAR Fact Sheets in areas where on-site staff can become familiar with species that may be encountered. • Develop and implement a Sighting Response Protocol in the Wildlife Management Plan which will include: ▪ Education of all on-site staff about SAR that may be encountered; ▪ For animals in immediate danger, handling procedures will be established for site personnel in the event that a SAR needs to be moved out of potential harm (i.e. off a road); ▪ Maintain a species observation log to track species observations during the operational phase of the project so that adaptive management can be applied based on species concentrations; and • All required permits under Section 73(2) of SARA will be obtained prior to handling SAR.	*Residual effect on change in behaviour* • Effects on the behaviour of bat SAR can be minimized provided recommended mitigation is implemented; however, some bat SAR may exhibit altered feeding behaviour. *Residual effect for change in mortality risk* • Increase in mortality risk to bat SAR can be minimized provided recommended mitigation is implemented; however, isolated mortality of bat SAR is possible through collisions with WTGs and maintenance activities.

Table 6-5: Potential Effects, Proposed Mitigation Measures and Residual Effects – Operations

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
Land and Resources Used for Traditional Purposes by Aboriginal Persons	• WTG operation • WTG, collector system, road and crossing repair / maintenance	• Change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering due to loss of habitat and disturbance to wildlife and vegetation species.	• Develop a site policy for safety and permitted access within the HIWEC on HIFN I.R. #2 regarding Aboriginal traditional uses allowed on the site during operations (e.g., a firearms and / or hunting policy). • Ensure maintenance activity is limited to pre-determined work areas. • Mitigation measures proposed in under the Vegetation and Ecological Communities VEC, Wildlife and Wildlife Habitat VEC and Fish and Fish Habitat VEC to minimize disturbance to wildlife will serve to further reduce impacts to HIFN traditional use activities.	*No residual effects* • Change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering will be confined to WTG locations (approximately 173.1 ha or 1.4% of the HIWEC study area) are temporary and will be available after decommissioning. Development of a site policy for safety and permitted access within the HIWEC on HIFN I.R. #2 regarding traditional uses will minimize potential effects.
	• WTG, collector system, road and crossing repair / maintenance • Environmental monitoring	• Disturbance to current land users from noise associated with maintenance activity.	• Limit maintenance activities to daylight hours. • Maintain ongoing communication with Bekanon Road residents, other HIFN members on HIFN I.R. #2 and other affected land users about maintenance timelines and activities. • Equip vehicles with effective muffler and exhaust systems. • Avoid unnecessary idling of engines. • Ensure that maintenance equipment is frequently maintained and kept in good working condition. • Ensure that noise emissions from maintenance equipment not exceed guidelines specified in MOECC publication NPC-115 and manufacturer recommendations. • Implement construction speed limit of 30 km/hr on all access roads. • Undertake pile driving and blasting operations in accordance with applicable federal and provincial guidelines. • If complaints arise, develop and maintain a reporting log, respond to complaint in a timely fashion and mitigate accordingly.	*Residual effect on land users* • Noise associated with maintenance activity will be very infrequent and is not expected to affect nearby receptors; however, some noise may be experienced at nearby receptors.
	• WTG operation	• Disturbance to current land users resulting from noise from WTG operation.	• Noise levels from WTGs at all non-participating receptors will comply with regulatory requirements for similar projects in Ontario.	*Residual effect on land users* • Some WTG operational noise may be heard at nearby receptors but will remain below provincial standards (see **Appendix M** for detailed operational noise assessment).
Cultural Resources / Heritage and Archaeological Sites	• WTG operation • WTG, collector system, road and crossing repair / maintenance • Environmental monitoring	*Potential effects on archaeological resources* • Potential impact unknown archaeological resources during maintenance.	• Should any archaeological sites or material be identified during operations, all maintenance activities must stop until an Archaeologist can evaluate the situation and carry out any required assessment to preserve the archaeological information. Maintenance activities will not re-commence until any negative impacts to archaeological resources are mitigated either through fully excavating any archaeological sites and removing them from the ground, or by adjusting infrastructure placement to avoid archaeological sites. • In addition, an Archaeology and Cultural Resources Management Plan for discovery of unknown archaeological sites during operations will be prepared and implemented as part of an EPP.	*No residual effects* • No effects to archaeological resources provided the resources are mitigated through excavation or avoidance.
		Potential direct and indirect effects on cultural heritage features • Potential to impact cultural heritage features during maintenance activities.	• Infrastructure will be sited to avoid direct and indirect effects to cultural heritage resources. • In addition, an Archaeology and Cultural Resources Management Plan for discovery of unknown cultural heritage features during operations will be prepared and implemented as part of an EPP.	*No residual effects* • No effects to cultural heritage resources provided the infrastructure is sited to avoid direct and indirect effects.
Air Quality	• WTG, collector system, road and crossing repair / maintenance • Environmental monitoring	• Vehicle and equipment emissions contributing to a reduction in local air quality.	• Equip vehicles with effective exhaust systems. • Avoid unnecessary idling of engines. • Ensure that maintenance equipment is frequently maintained and kept in good working condition.	*No residual effects* • Emissions from maintenance activities are not anticipated to result in a measureable increase in local or regional air quality parameters.
		• Dust generation from maintenance vehicle access contributing to a reduction in local air quality.	• Implement speed limit of 30 km/hr on all access roads. • Conduct dust suppression (i.e., spraying water on access roads and work areas) during dry conditions to minimize dust generation. • If complaints arise, develop and maintain a reporting log, respond to complaint in a timely fashion and mitigate accordingly.	*No residual effects* • Emissions from maintenance activities are not anticipated to result in a measureable increase in local or regional air quality parameters.

Table 6-5: Potential Effects, Proposed Mitigation Measures and Residual Effects – Operations

VEC	Project Activity	Potential Environmental Effects	Proposed Mitigation Measures	Residual Environmental Effects
Local Residents, Cottagers and Businesses	• WTG operation • WTG, collector system, road and crossing repair / maintenance	• Reduced access to HIFN I.R. #2 by Aboriginal and non-Aboriginal residence / cottage owners on HIFN I.R. #2.	• Develop access plans for authorized users during the operations phase. • Maintain ongoing communication with authorized users of HIFN I.R. #2 and other affected adjacent land users about maintenance activities and associated access limitations. • Maintain existing access to primary use areas including Henvey Inlet throughout operations. • Access limitations will be confined to active maintenance areas. Work restricted areas to be clearly marked.	*No residual effects* • Reduced access to lands within and adjacent to HIFN I.R. #2 for recreation is not anticipated as access to primary recreation and tourism areas such as Henvey Inlet, will not be restricted.
	• WTG, collector system, road and crossing repair / maintenance • Environmental monitoring	• Disturbance to local residents, cottagers and businesses due to noise from noise associated with maintenance activity.	• Mitigation for disturbance to local residents, cottagers and businesses due to noise from WTG and TS operation and maintenance is considered under the Land and Resources Used for Traditional Purposes by Aboriginal Persons VEC.	*Residual effect on local residents, cottagers and businesses* • Disturbance to local residents, cottagers and businesses can be partially mitigated by complying with regulatory noise emission standards and standard practices for operation and maintenance noise effects; however, some disturbance will remain.
	• WTG operation	• Disturbance to local residents, cottagers, businesses, overnight accommodations and recreational activities resulting from noise from WTG operation.	• Noise emissions from WTGs at all non-participating receptors will comply with regulatory requirements for similar projects in Ontario.	*Residual effect on local residents, cottagers and businesses* • Some WTG operational noise may be heard at nearby receptors but will remain below provincial standards (see **Appendix M** for detailed operational noise assessment).
		• Changes to the visual landscape for local residents, cottagers and businesses from the operation of WTGs.	• Minimum 500 m setback from Georgian Bay shoreline. • Potential WTG locations in areas along the Key River, Henvey Inlet and Georgian Bay have been removed as only up to 91 locations will be constructed. • No vegetation clearing within 120 m of Georgian Bay, Henvey Inlet and Key River shoreline areas to preserve the shoreline landscape where possible. HIW will ensure that the final location and determination of WTGs to be constructed meet a setback of 120 m from waterbodies and shoreline. • Limit WTG markings to manufacturer / company markings / logos. • WTG lighting beam angle will be adjusted to minimize lighting observed from ground level. • Avoid white obstruction lighting. • Ensure that all lights flash simultaneously. • Use minimum amount of lighting required to meet Transport Canada requirements.	*Residual effect on local residents, cottagers and businesses* • Changes to the visual landscape for local residents, cottagers and businesses will be partially mitigated by applying minimum setbacks from waterbodies, minimizing lighting requirements and reducing the overall layout from 120 to up to 91 WTGs. However, there will be some residual effect as WTGs will continue to be visible from various vantage points within and adjacent to the HIWEC study area.
Recreation and Tourism	• WTG operation • WTG, collector system, road and crossing repair / maintenance • Environmental monitoring	• Avoidance of overnight accommodations and recreational activities near the HIWEC due to noise from WTG and TS operation. • Avoidance of overnight accommodations and recreational activities near the HIWEC due to noise from maintenance vehicles and equipment.	• Mitigation for avoidance of overnight accommodations and recreational activities due to noise from WTG and TS operation and maintenance is considered under the Land and Resources Used for Traditional Purposes by Aboriginal Persons VEC.	*Residual effect on overnight accommodations and recreational activities* • Avoidance of overnight accommodations and recreational activities near HIWEC is not anticipated. • Any disturbance can be partially mitigated by complying with regulatory noise emission standards for similar projects and standard practices for operation and maintenance noise effects; however, some disturbance may remain.
		• Avoidance of overnight accommodations and recreational activities near the HIWEC from changes to the visual landscape.	• Minimum 500 m setback from Georgian Bay shoreline. • Potential WTG locations along the Key River and Georgian Bay have been removed as only up to 91 locations will be constructed. • No vegetation clearing within 120 m of Georgian Bay, Henvey Inlet and Key River shoreline areas to preserve the shoreline landscape where possible. HIW will ensure that the final location and determination of WTGs to be constructed meet a setback of 120 m from waterbodies and shoreline. • Limit WTG markings to manufacturer / company markings / logos. • WTG lighting beam angle will be adjusted to minimize lighting observed from ground level. • Avoid white obstruction lighting. • Ensure that all lights flash simultaneously. • Use minimum amount of lighting required to meet Transport Canada requirements.	*Residual effects on overnight accommodations and recreational activities* • Avoidance of overnight accommodations and recreational activities near the HIWEC due to changes to the visual landscape during operations is not anticipated, but difficult to predict; some avoidance by people who do not like the appearance of wind WTGs is possible. Changes to the visual landscape will be minimized by applying minimum setbacks from waterbodies and reducing the overall layout from 120 to up to 91 WTGs; however, WTGs will be visible from various vantage points within and adjacent to the HIWEC study area.
Community Services and Infrastructure	• WTG operation	• Increase in truck traffic where the south access road crosses Bekanon Road.	• Prohibit maintenance vehicles (including personal vehicles) from travelling along Bekanon Road, except to cross Bekanon Road.	*Residual effect on traffic near south access road* • Construction vehicles will not be permitted to travel along Bekanon Road so minimal residual traffic effects may occur intermittently throughout the operations and maintenance period.

6.4 Residual Effects Characterization and Evaluation of Significance

6.4.1 Construction and Decommissioning

As per **Section 3.2.5**, only adverse residual effects are evaluated against the criteria outlined in **Table 3-2**. An assessed determination of minor, moderate or major for each criterion is included in the table below, along with an overall statement of significance for each predicted adverse residual effect (**Table 6-6**).

6.4.2 Operations

As per **Section 3.2.5**, only adverse residual effects are evaluated against the criteria outlined in **Table 3-2**. An assessed determination of minor, moderate or major for each criterion is included in the table below, along with an overall statement of significance for each predicted adverse residual effect (**Table 6-7**).

Table 6-6: Evaluation of Significance of Predicted Residual Effects – Construction / Decommissioning

VEC	Residual Environmental Effects	Magnitude	Spatial Extent	Duration / Frequency	Permanence	Context	Significance Statement
Soils and Terrain	• Effects on soil quality (erosion, topsoil mixing, spills, blasting)	• Minor; proposed mitigation measures are expected to minimize or mitigate effects related mixing of topsoil but is expected to be detectable at a local level. • Minor; construction of roads, substation, on-Reserve transmission line and WTG construction footprint will effect 254.8 ha (5.7%) of land with potential soil content (i.e., not classified as rock barren in ELC mapping). • Minor; proposed mitigation measures are expected to minimize impacts from spills.	• Minor; disturbance of soil quality and mixing of topsoil will be confined to areas where vegetation clearing and excavation is required within the construction footprint within the HIWEC.	• Minor; effect is expected to occur frequently within the HIWEC, for short durations during the construction phase and it is expected that importation of topsoil is required during the decommissioning phase. • Minor; effect from spills is short in duration and infrequent during the construction and decommissioning phase.	• Minor; importation of topsoil is required during the decommissioning phase and therefore, effect is not considered permanent. • Minor; effect of soil contamination within construction footprint is not permanent and can be restored after spill incident.	• Minor; effect is on a common feature.	• Disturbance of soil resulting in erosion, blasting and mixing of topsoil and subsoil will be confined to designated construction areas and occur frequently within the HIWEC for short durations during the construction period. Affected areas will be restored through the application of imported clean topsoil or the effective application of stockpiled topsoil. • Reduction in soil quality due to the accidental release of contaminants will be localized and occur infrequently during the construction and decommissioning period. Effects to soil quality will be confined to the construction footprints and localized to a small area where the spill occurred. Effects to soil quality can be easily remediated and soil quality restored to conditions similar to baseline. • After applying effective mitigation, the effect is not significant.
	• Effects on soil quantity (compaction, erosion, excavation, blasting)	• Minor; construction of roads, substation, on-Reserve transmission line and WTG construction footprint will effect 254.8 ha (5.7%) of land with potential soil content (i.e., not classified as rock barren in ELC mapping). • Moderate; change in soil quantity resulting in slope instability exceeds existing conditions in areas where blasting is required.	• Minor; disturbance to soil quantity will be confined to construction footprints within the HIWEC.	• Minor; effect is evident for a short duration during the construction phase before reclamation activities is complete. • Minor; disturbance due to blasting will occur frequently and at multiple locations, but is limited to the construction phase.	• Minor; effect is temporary during construction. • Major; effect to topography is permanent and is not easily reversible.	• Minor; effect is on a common feature.	• Disturbance of soil resulting in erosion, compaction and removal will be confined to the designated construction areas and occur frequently within the HIWEC for short durations during the construction period. Affected areas will be restored through the application of imported clean topsoil or the effective application of stockpiled topsoil. • Disturbance to soil quantity resulting in slope instability will be localized and occur for short durations intermittently throughout the construction period. Slope instability due to blasting can be mitigated through the application of slope stability techniques. • After applying effective mitigation, the effect is not significant. • After applying identified mitigation, the effect is not significant.

Table 6-6: Evaluation of Significance of Predicted Residual Effects – Construction / Decommissioning

VEC	Residual Environmental Effects	Magnitude	Spatial Extent	Duration / Frequency	Permanence	Context	Significance Statement
Groundwater	• Effects on groundwater quality (blasting operation, spills, dewatering discharge)	• Minor; proposed mitigation measures are expected to minimize or mitigate effects related to the reduction in groundwater quality and physical damage to supply wells from blasting and pile driving activities, and therefore the effect to groundwater quality is anticipate to be minor. • Minor to Moderate; proposed mitigation measures are expected to minimize impacts from spills.	• Minor; effect to groundwater quality is predicted to be confined to the blast zone of influence, which is predicted to be within the HIWEC study area. • Moderate; reduction in groundwater quality may extend past the HIWEC study area and is dependent on groundwater flow patterns.	• Minor; effect is evident for a short duration and is infrequent during construction and only for spills during decommissioning.	• Minor; effect is readily reversible by supplying well owners with potable water for a short duration and / or providing an alternative source of water (i.e., new well) as a permanent solution. • Moderate; residual contamination of groundwater may occur due to limitation in current spill clean-up processes.	• Minor; hydrogeological conditions relating to groundwater systems is a common feature within the HIWEC study area.	• Effects to groundwater and private water wells will be confined to an area around blasting locations (Blast Zone of Influence), which is predicted to be a small area relative to the HIWEC study area. The effects of blasting will occur for a short duration or until contingency measures are applied (i.e., provide well owner with alternative source of water). • Reduction in groundwater quality due to the accidental release of contaminants will be localized and occur infrequently during the construction and decommissioning period. Effects to groundwater quality may extend beyond the HIWEC study area and the extent of contamination is dependent on local groundwater flow patterns. Groundwater contamination within a fractured bedrock aquifer is not easily remediated and may remain for a time exceeding that of the construction or decommissioning phase if current spill clean-up processes cannot be applied. • After applying identified mitigation, the effect is not significant.
	• Effects on groundwater quantity (blasting operations, dewatering and water taking)	• Minor; proposed mitigation measures are expected to minimize or mitigate effects related to the reduction in groundwater quantity and physical damage to supply wells from blasting and pile driving activities, and therefore the effect to groundwater quality is anticipate to be minor. • Minor; reduction in ground quantity resulting in changes in groundwater flow patterns will likely exceed existing conditions but is considered inconsequential due to the application of mitigation measures and the amount of area effects compared to the size of the HIWEC study area.	• Minor; potential effect to groundwater quantity is predicted to be confined to the blast zone of influence and / or dewatering ZOI, which is predicted to be within the HIWEC study area.	• Minor; temporary in nature and restricted to the duration of construction dewatering activities.	• Minor; potential effect is readily reversible once construction dewatering and water taking activities cease and impacted aquifer recovers or well owners are provided with an alternative source of water (i.e., new well) as a permanent solution.	• Minor; hydrogeological conditions relating to groundwater systems is a common feature within the HIWEC study area.	• Effects to groundwater quantity due to blasting, dewatering and water taking activities will be localized to an area around the water taking locations (Dewatering ZOI), which is predicted to be a small area relative to the HIWEC study area. The effects of water taking will occur for a short duration or until contingency measures are applied (i.e., provide well owner with alternative source of water) and will naturally reverse once water taking activities stop. • After applying identified mitigation, the effect is not significant.

Table 6-6: Evaluation of Significance of Predicted Residual Effects – Construction / Decommissioning

VEC	Residual Environmental Effects	Magnitude	Spatial Extent	Duration / Frequency	Permanence	Context	Significance Statement
Wildlife and Wildlife Habitat	• Habitat change (including possible damage, loss, destruction and / or fragmentation)	• Moderate; up to 192.3 ha of wildlife habitat will be temporarily removed for construction of the HIWEC. The total available wildlife habitat within the study area is 12,278 ha. This will result in the temporary loss of approximately 1.6% of wildlife habitat within the study area. Remaining wildlife habitat will also be fragmented. The permanent footprint following construction will be approximately 173.1 ha or 1.4% of the HIWEC study area.	• Minor; habitat change will occur within the construction footprint.	• Minor; habitat change will be evident during one (1) phase and occurs infrequently.	• Moderate; effect is not readily reversible during the life of the HIWEC. • Some wildlife habitat removal for HIWEC infrastructure will exist for the duration of the HIWEC. However, rehabilitation of temporarily disturbed areas will occur post-construction.	• Minor; effect is on habitat that is considered common within the study area and regionally.	• An estimated 192.3 ha of previously undisturbed wildlife habitat will be removed for HIWEC development. Wildlife habitat is abundant within the study area, and permanent habitat removal and fragmentation will be localized to the HIWEC footprint (173.1 ha) representing a permanent loss of 1.4% of available habitat. A number of areas will be rehabilitated after decommissioning. However, habitat loss as a result of HIWEC development will result in some permanent loss of habitat which is not anticipated to reduce habitat availability beyond a level capable of sustaining wildlife populations, including SOCC, in the study area. • After applying identified mitigation, monitoring and follow-up the effect is not significant.
	• Change in mortality risk (including harm, harassment and /or killing of wildlife)	• Minor; proposed mitigation measures are expected to minimize potential wildlife mortality during construction. Wildlife is abundant within the study area and construction related mortality is expected to be minor.	• Minor; change in mortality risk may occur within the construction footprint.	• Minor; increased mortality risk may occur infrequently during the construction phase.	• Minor; increased mortality risk is reversible following construction and is not anticipated to have long-lasting population-level effects.	• Moderate; effect is on a sensitive feature that is common within the study area and regionally. • Some sensitive features (i.e., SOCC) have the potential for increased mortality, although they are widespread within the study area and regionally.	• Existing wildlife is abundant within the HIWEC and, given the proposed mitigation, mortality risk is anticipated to be low and will not likely affect the viability and sustainability of populations of SOCC or other wildlife within the study area and regionally. • After applying identified mitigation, monitoring and follow-up the effect is not significant.
	• Change in behaviour	• Moderate; proposed mitigation measures are expected to minimize changes in wildlife behaviour; however, some wildlife are expected to exhibit avoidance behaviour during construction activities due to the presence of humans and noise.	• Moderate; change in behaviour may occur within the study area.	• Moderate; changes in behaviour may occur frequently throughout the construction phase.	• Minor; disturbance of wildlife is reversible following the construction phase.	• Moderate; effect is on a sensitive feature that is common within the study area and regionally. • Some sensitive features (i.e., SOCC) have the potential for increased mortality, although they are widespread within the study area and regionally.	• Existing wildlife (including common wildlife and SOCC) is abundant within the study area and, given the proposed mitigation, change in behaviour is anticipated to be of a short duration which will not likely affect the viability and sustainability of populations within the study area and regionally. • After applying identified mitigation, monitoring and follow-up, the effect is not significant.

Table 6-6: Evaluation of Significance of Predicted Residual Effects – Construction / Decommissioning

VEC	Residual Environmental Effects	Magnitude	Spatial Extent	Duration / Frequency	Permanence	Context	Significance Statement
Vegetation and Ecological Communities	• Change in community diversity (including community loss)	• Moderate; up to 192.3 ha of vegetation will be temporarily removed for construction of the HIWEC. The total available vegetation within the study area is 12,278 ha. This will result in the temporary loss of approximately 1.6% of vegetation within the study area. Remaining vegetation will also be fragmented. The permanent footprint following construction is approximately 173.1 ha or 1.4% of the study area. • Up to 7.5 ha of potential old growth forest, which makes up approximately 1% of potential old growth forest within the study area, will be removed.	• Minor; change in community diversity will occur within the construction footprint.	• Minor; community diversity change will be evident during one phase and occurs infrequently.	• Moderate; effect is not readily reversible during the life of the HIWEC. • Some vegetation removal for HIWEC infrastructure will exist for the duration of the HIWEC. Rehabilitation of temporarily disturbed areas will occur immediately post-construction; however, rehabilitation of potential old growth forest will take at least 140 years.	• Minor; overall effect is on vegetation that is considered common within the study area and regionally. • *Moderate; the effect is on a sensitive feature (i.e., potential old growth forest) that is common within the study area. * Note – this Effect Level Definition is based on worst case scenario and will be confirmed based on fall confirmatory surveys for old growth forest for the Final EA.	• An estimated 192.3 ha of previously undisturbed vegetation will be removed for HIWEC development. Vegetation covers the entire study area and permanent vegetation removal and fragmentation will be localized to the HIWEC footprint (173.1 ha) representing a permanent loss of 1.4% of available vegetation. A number of areas will be rehabilitated after decommissioning. However, vegetation loss as a result of HIWEC development will result in some permanent loss of vegetation which is not anticipated to reduce community diversity within the study area beyond the construction footprint. • Potential old growth forest loss is a maximum of 7.5 ha or 1% of potential old growth within the study area. HIW will conduct pre-construction old growth forest surveys within areas identified as potential old growth forest, and will focus on avoidance and minimization of disturbance through potential adjustment of component locations where old growth communities are confirmed. • There is a low probability of contaminants spills and limited magnitude of effects on community diversity. Minor leaks or spills may occur but are highly unlikely to affect community diversity. Application of mitigation and spill response measures are expected to avoid most residual effects. • After applying identified mitigation, monitoring and follow-up the effect is not significant.
	• Change in wetland quantity and function	**Quantity** • Moderate; up to 24.5 ha of wetland will be removed during construction. This comprises 1% of wetlands within the HIFN I.R. #2. This includes up to 18.0 ha of swamp, up to 2.8 ha of fen, up to 2.6 ha of bog and up to 1.1 ha of marsh.	**Quantity** • Minor; change in wetland quantity will occur within the construction footprint. **Function** • Moderate; change in wetland function is possible beyond the construction footprint and within the study area.	**Quantity** • Minor; loss of wetlands will be evident during one (1) phase and occurs infrequently. **Function** • Minor; change in function will be evident during the construction phase and is anticipated to occur infrequently and for short duration.	**Quantity** • Moderate; effect is not readily reversible during the life of the HIWEC. • Rehabilitation of temporarily disturbed areas will occur immediately post-construction; however, the time it will take to rehabilitate bog and fen habitat will extend beyond the life of the HIWEC.	**Quantity** • Moderate; effect is on a sensitive feature that is common within the study area and regionally. **Function** • Moderate; effect is on a sensitive feature that is common within the study area and regionally.	• Following the mitigation hierarchy for wetlands (EC, 1996) the HIWEC has been sited to avoid as much wetland area as possible, leaving a moderate effect of up to 24.5 ha (1%) of wetland removal within the HIFN I.R. #2. A further reduced HIWEC footprint is anticipated as the HIWEC progresses. This will further minimize the removal of

Table 6-6: Evaluation of Significance of Predicted Residual Effects – Construction / Decommissioning

VEC	Residual Environmental Effects	Magnitude	Spatial Extent	Duration / Frequency	Permanence	Context	Significance Statement
		Function • Moderate; up to 2.9 ha (0.1% of wetland within HIFN I.R. #2) of wetland loss will result in edge effects (i.e., infrastructure will be developed on the edge but not completely fragmenting wetlands). Up to 21.4 ha of wetland loss (0.9% of wetland within HIFN I.R. #2) will result in fragmentation of greater wetland units or permanent loss of small isolated wetland units including one (1) bog and one (1) swamp, totaling up to 0.24 ha.			**Function** • Minor; although fragmentation of wetlands is not readily reversible, it is anticipated to be inconsequential to overall function.		wetlands. Residual effects on wetland function are generally anticipated to be minor. • After applying identified mitigation, monitoring and follow-up, the effect is not significant.
Surface Water	• Effects on surface water quality (spills, erosion, sedimentation and blasting)	• Minor; effect will be a minor change to existing conditions.	• Minor; isolated to construction footprint.	• Minor; effect would only be felt during construction as the spill would be cleaned up.	• Minor; effect is reversible over a short period of time.	• Minor to Moderate; effect is on a common to sensitive feature that is common.	• Low probability of spills of contaminants and limited magnitude of effects on surface water quality. Minor leaks or spills may occur. Application of mitigation and spill response measures are expected to avoid significant adverse residual effects. • Erosion and sedimentation effects are isolated to the HIWEC construction footprint and expected to be minor in magnitude and duration. • After applying the identified mitigation, the effect is not significant.
	• Effects on surface water quantity (water crossing)	• Minor; effect is inconsequential or minor.	• Minor; isolated to construction footprint.	• Minor; one-time installation of crossing structure during construction.	• Minor; effect is reversible following construction activities.	• Minor; effects resulting from changes are on a common feature.	• Drainage / road design, mitigation and rehabilitation will minimize and localize adverse residual effects. • After applying the identified mitigation, the effect is not significant.
Fish and Fish Habitat	• Effects on fish habitat (water crossing installation and removal, erosion and sedimentation, and spills)	• Minor to Moderate; effect may exceed existing conditions but will follow the *Fisheries Act*.	• Minor; limited to localized crossing of watercourse in construction footprint.	• Minor; one-time installation or short in duration that will take place in days or weeks.	• Minor; where footprint in waterbody is minimal, and for erosion, sedimentation and / or spills readily reversible over a short period of time.	• Minor to Moderate; effect may be on a sensitive feature that is common within the HIWEC study area	• Effects related to water crossing installation and erosion and sedimentation will be temporary in nature and minor in duration, spatial extent and permanence. • Low probability of spills of contaminants and limited magnitude of effects on surface water quality. Minor leaks or spills may occur. Application of mitigation and spill response measures are expected to avoid significant residual adverse effects. • After applying the identified mitigation, the effect is not significant.

Table 6-6: Evaluation of Significance of Predicted Residual Effects – Construction / Decommissioning

VEC	Residual Environmental Effects	Magnitude	Spatial Extent	Duration / Frequency	Permanence	Context	Significance Statement
	• Effects on fish mortality risk (blasting and / or vibration, water crossing installation, and spills)	• Minor; effect will be a minor change from existing conditions. • Minor to Moderate; effect may exceed existing conditions but will follow the *Fisheries Act*.	• Minor; localized to construction footprint.	• Minor; Frequency – blasting is one-time during construction. Duration – short term (days). • Minor; spills during construction are infrequent and short in duration (days to weeks). • Minor; one-time water crossing installation or short in duration that will take place in days or weeks.	• Minor; effect is readily reversible over a short period of time.	• Minor to Moderate; effect is on a common to sensitive feature that is common.	• With the implementation of a blasting plan, avoidance of blasting in waterbodies, timing windows, and implementation of mitigation and spill response measures residual effects can be minimized • After applying the identified mitigation, the effect is not significant.
Species at Risk Refer to **Appendix P** for a more detailed discussion of evaluation of significance of predicted residual effects for SAR.	• Habitat change (including possible damage, destruction and / or fragmentation of SAR residences or SAR habitat)	• Avian SAR: 0.7% to 3.0% of suitable habitat loss. • Turtle SAR: 1.0% to 2.3% of suitable habitat loss. • Snake SAR: 1.0% to 3.9% of suitable habitat loss. • Bat SAR: up to 2.2% of suitable habitat loss. • Moderate for all SAR; proposed mitigation measures will limit habitat loss to the area of construction but some SAR habitat will be removed and some of the remaining bird SAR habitat may be fragmented during HIWEC construction. Federal legislation (i.e., *SARA*) allows for damage or destruction of SAR residences or SAR critical habitat with a permit.	• Minor; habitat change will occur within the construction footprint.	• Minor; habitat change will be evident during one phase and occurs infrequently.	• Moderate; effect is not readily reversible during the life of the HIWEC. • Rehabilitation of temporarily disturbed areas will occur immediately post-construction; however, the time it will take to rehabilitate bog and fen habitat will extend beyond the life of the HIWEC.	• Moderate; effect is on a sensitive feature (SAR habitat) that is common within the study area and regionally for most of the SAR present in the HIWEC study area.	• Some SAR habitat will be removed and / or fragmented during construction of the HIWEC. SAR habitat is abundant within the study area. HIW is committed to developing a detailed monitoring and follow-up program for these species and, if required, will develop a compensation plan with EC-CWS based on the results of the monitoring and follow-up program. • After applying identified mitigation, monitoring, follow-up and potential compensation the effect is not significant.
	• Change in mortality risk (including harm, harassment and /or killing of SAR)	• Moderate; proposed mitigation measures will limit mortality to SAR; however, even with these mitigation measures there is still a possibility for SAR mortality. Many SAR populations are vulnerable to even a very small amount of additional mortality. Federal legislation (i.e., *SARA*) allows for killing or harming individual SAR with a permit.	• Minor; SAR mortality may occur within the construction footprint.	• Minor; increased mortality risk may occur infrequently during the construction phase.	• Minor; increased mortality risk is readily reversible during the life of the HIWEC. Isolated SAR mortality, if it occurs, is not anticipated to have long-term population level effects.	• Moderate; overall effect is on a sensitive feature (overall SAR populations) that is considered common within the study area and regionally. Kirtland's Warbler is a sensitive feature that is not common; however, the likelihood of mortality to this species is considered very low with the implementation of mitigation measures.	• The increased risk of mortality to SAR related to the HIWEC may result in isolated SAR mortality during construction. HIW is committed to developing a detailed monitoring and follow-up program for these species and, if required, will develop a compensation plan with EC-CWS based on the results of the monitoring and follow-up program. • After applying identified mitigation, monitoring, follow-up and potential compensation the effect is not significant.
	• Change in behaviour, due to disturbance of SAR.	• Moderate; proposed mitigation measures are expected to minimize changes in SAR behaviour; however, some SAR are expected to exhibit avoidance behaviour during construction activities due to the presence of humans and noise.	• Moderate; change in SAR behaviour may occur within the study area.	• Moderate; changes in SAR behaviour may occur frequently throughout the construction phase.	• Minor; disturbance of SAR is reversible following the construction phase.	• Moderate; overall effect is on sensitive feature (overall SAR populations) that is considered common within the study area and regionally. • Major; effect is on a sensitive feature (Kirtland's Warbler) that is not common. However, an observed effect (if any) is expected to be localized and temporary in nature.	• Disturbance effects to SAR will be minimized by the identified mitigation measures. • After applying identified mitigation, monitoring, follow-up and potential compensation the effect is not significant.

Table 6-6: Evaluation of Significance of Predicted Residual Effects – Construction / Decommissioning

VEC	Residual Environmental Effects	Magnitude	Spatial Extent	Duration / Frequency	Permanence	Context	Significance Statement
Land and Resources Used for Traditional Purposes by Aboriginal Persons **Local Residents, Cottagers and Businesses**	• Temporary change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering due to loss of habitat and disturbance to wildlife and vegetation species within the construction footprint active construction areas	• Minor; up to 192.3 ha (1.6%) of land will be disturbed for construction of the HIWEC, while 173.1 ha (1.4%) will be permanently removed resulting in a minor change to existing conditions.	• Minor; temporary habitat change will occur in the construction footprint.	• Minor; effect is evident during construction phase and occurs infrequently and for short durations.	• Minor; effect is reversible upon completion of HIWEC construction / decommissioning. Some habitat removal for HIWEC infrastructure will exist for the duration of the HIWEC. However, rehabilitation of temporarily disturbed areas will occur post-construction.	• Minor; effect is on a common VEC.	• After applying the identified mitigation, the effect is not significant.
	• Reduced access confined to active construction areas within the study area	• Minor; effect is a minor change to existing conditions as traditional land use can continue throughout the majority of HIFN I.R. #2 throughout the construction period.	• Minor; effects are within or directly adjacent to the construction footprint at active construction areas.	• Minor; effect is evident during construction phase and occurs infrequently and for short durations.	• Minor; effect is reversible upon completion of HIWEC construction / decommissioning.	• Minor; effect is on a common VEC.	• After applying the identified mitigation, the effect is not significant.
Noise (as it relates to Land and Resources Used for Traditional Purposes by Aboriginal Persons; Local Residents, Cottagers and Businesses; and Recreation and Tourism VECs)	• Intermittent disturbance to current land users, local residents, cottagers, businesses, overnight accommodations and recreational activities from construction / decommissioning noise and vibration	• Minor to Moderate; will exceed existing conditions intermittently during blasting and other construction activity.	• Moderate; effects primarily localized within and / or near the construction footprint, with some noise audible at 1 km.	• Minor; effects will be evident during construction activities and will occur infrequently for short durations during blasting activity.	• Minor; effect is reversible upon completion of HIWEC construction / decommissioning.	• Minor; effect is on a common VEC. Low population density currently experiences anthropogenic noise from Highway 69 and boat traffic on Georgian Bay, Henvey Inlet and Key River.	• After applying identified mitigation, the effect is not significant.
Community Services and Infrastructure	• Increase in truck traffic where the south access road crosses Bekanon Road	• Minor; increased truck traffic will be confined to access roads and the crossing is west of most residents along Bekanon Road.	• Minor; effect is within and / or near the HIWEC study area.	• Minor; effect is evident during construction and decommissioning activities and occurs infrequently for short durations.	• Minor; effect is reversible upon completion of HIWEC construction / decommissioning.	• Minor; effect is on a common VEC.	• After applying identified mitigation, the effect is not significant.

Table 6-7: Evaluation of Significance of Predicted Residual Effects – Operations

VEC	Residual Environmental Effects	Magnitude	Spatial Extent	Duration / Frequency	Permanence	Context	Significance Statement
Soils and Terrain	• Effects on soil quality and quantity (spills)	• Minor; effect on soils may exceed existing conditions, with residual contaminants after mitigation.	• Minor; effect is confined to the HIWEC footprint.	• Moderate; effect on soil quality and quantity may occur infrequently during the operations phase.	• Minor; effect is readily reversible during the life of the HIWEC.	• Minor; soil is common throughout the HIWEC study area.	• Reduction in soil quality due to the accidental release of contaminants will be localized and occur infrequently during the operations period. Effects to soil quality will be confined to designated work areas and localized to a small area where the spill occurred. Effects to soil quality can be easily remediated and soil quality restored to conditions similar to baseline. • After applying the identified mitigation, the effect is not significant.
Groundwater	Effects on groundwater quantity (impervious surfaces)	• Minor; effect to groundwater recharge is expected to exceed existing conditions but is considered inconsequential due to the application of mitigation measures and the amount of area effects compared to the size of the HIWEC study area.	• Minor; residual effects to groundwater recharge are within the HIWEC study area.	• Moderate; effect on groundwater recharge is within the operating phase.	• Moderate; effect to groundwater recharge is not readily reversible during the life of the HIWEC study area.	• Minor; geological conditions promoting groundwater recharge is a common feature within the HIWEC study area.	• Reduction in groundwater recharge due to an increase in impervious surface is considered inconsequential due to the limited extent of potentially affected area. A minor reduction in groundwater recharge will occur locally in areas where infrastructure components (i.e., WTG foundations and paved or compressed gravel surfaces) occur and are located near watercourses that will convey water to larger bodies of water, limiting the potential for surface water to recharge local groundwater aquifers. • After applying identified mitigation, the effect is not significant.
	• Effects on groundwater quality (spills)	• Minor to Moderate; effect on groundwater may exceed existing conditions, with residual contaminants after mitigation.	• Moderate; reduction in groundwater quality may extend past the HIWEC study area and is dependent on groundwater flow patterns.	• Moderate; effect on groundwater quality may occur infrequently during the operations phase.	• Moderate; effect to contamination of groundwater is not easily restored to baseline conditions if conventional clean-up processes cannot be applied due to the nature of a highly fractured bedrock aquifer system.	• Minor; effect to groundwater quality can be restored to conditions similar to baseline.	• Reduction in groundwater quality due to the accidental release of contaminants will occur infrequently during the operations period. Effects to groundwater quality may extend beyond the HIWEC study area and the extent of contamination is dependent on local groundwater flow patterns. Groundwater contamination within a fractured bedrock aquifer is not easily remediated and may remain for a time exceeding that of the operations or decommissioning phase if current spill clean-up processes cannot be applied. • After applying the identified mitigation, the effect is not significant.
Wildlife and Wildlife Habitat	• Change in mortality risk (including harm, harassment and / or killing of wildlife)	• Moderate; bird and / or bat mortality will exceed existing conditions; however, mortality rates are expected to be less than provincial regulatory criteria (i.e.; thresholds as defined in MNRF, 2011a and 2011b) with the application of mitigation measures, monitoring, follow-up and contingency measures, if required, as per the Environmental Effects Monitoring Plan (EEMP). • Proposed mitigation measures will limit road mortality to wildlife.	• Minor; change in mortality risk will occur within the HIWEC footprint.	• Minor; increase in mortality risk will occur during one (1) phase (operations), and mortalities are anticipated to occur infrequently.	• Minor; effect is reversible during the life of the HIWEC with the implementation of adaptive management measures.	• Moderate; effect on common wildlife is minor within the study area and regionally. • Some sensitive features (i.e., SOCC) have the potential for increased mortality, although they are widespread within the study area and regionally.	• Existing wildlife is abundant within the study area, and given the proposed mitigation, mortality risk is anticipated to be low and will not likely affect the viability and sustainability of populations of SOCC or other wildlife within the study area or regionally. • After applying identified mitigation, monitoring and follow-up the effect is not significant.

Table 6-7: Evaluation of Significance of Predicted Residual Effects – Operations

VEC	Residual Environmental Effects	Magnitude	Spatial Extent	Duration / Frequency	Permanence	Context	Significance Statement
	• Change in behaviour	• Moderate; presence of humans and WTGs during operations may result in some changes in behaviour compared to existing conditions.	• Moderate; change in behaviour is possible within the study area.	• Moderate; change in behaviour will occur during one (1) phase (operations). However, if it occurs, change in behaviour may occur frequently and for short durations.	• Minor; effect is reversible during the life of the HIWEC with the implementation of adaptive management measures.	• Moderate; effect on common wildlife is minor within the study area and regionally. • Some sensitive features (i.e., SOCC) may exhibit a change in behaviour, although they are widespread within the study area as well as regionally.	• Existing wildlife (including common wildlife and SOCC) is abundant within the study area and, given the proposed mitigation, change in behaviour is not anticipated to affect the viability and sustainability of populations within the study area or regionally. • After applying identified mitigation, monitoring and follow-up, the effect is not significant.
Vegetation and Ecological Communities	• Change in species diversity	• Minor; proposed mitigation measures are expected to minimize or mitigate change in species diversity resulting from the introduction of invasive species.	• Moderate; change in species diversity resulting from the introduction of invasive species may occur within the study area.	• Minor; change in species diversity resulting from the introduction of invasive species may occur during one (1) phase (operations) and is anticipated to occur infrequently.	• Minor; the effect is readily reversible with the application of management recommendations.	• Minor; no rare plant species occur within the HIWEC study area; therefore, effects will occur only on common features.	• Residual effect of invasive species introductions resulting in change in species diversity is generally anticipated to be minor. • After applying identified mitigation, monitoring and follow-up, the effect is not significant.
	• Change in community diversity	• Minor; proposed mitigation measures are expected to minimize or mitigate change in community diversity resulting from the introduction of invasive species.	• Moderate; change in community diversity resulting from localized introduction of invasive species may occur within the study area.	• Minor; change in community diversity resulting from the introduction of invasive species may occur during one (1) phase (operations) and is anticipated to occur infrequently.	• Minor; the effect is readily reversible with the application of management recommendations.	• Minor; the effect is on a sensitive feature (e.g., potential old growth forest) that is expected to recover given that the effect is readily reversible with the application of management recommendations.	• Residual effect of invasive species introductions resulting in change in community diversity is generally anticipated to be minor. • After applying identified mitigation, monitoring and follow-up, the effect is not significant.
	• Change in wetland quantity and function	• Minor; proposed mitigation measures are expected to minimize or mitigate change in wetland quantity or function resulting from the introduction of invasive species.	• Minor; change in wetland quantity or function resulting from the introduction of invasive species may occur within the study area.	• Minor; change in wetland quantity or function resulting from the introduction of invasive species may occur during one (1) phase (operations) and is anticipated to occur infrequently.	• Minor; the effect is readily reversible with the application of management recommendations.	• Moderate; the effect is on a sensitive feature (wetlands) that is common within the study area and regionally.	• Residual effect of invasive species introductions resulting in change in wetland quantity and function is generally anticipated to be minor. • Should a loss of wetland function occur, a compensation plan will be developed in consultation with EC-CWS. • After applying identified mitigation, monitoring and follow-up, the effect is not significant.
Surface Water	• Effects on surface water quality (spills)	• Minor; effect is a minor change compared to existing conditions.	• Minor; isolated to footprint of HIWEC.	• Minor; low in frequency and short in duration (days to weeks).	• Minor; effect is reversible over a short period of time.	• Minor to Moderate; effect may be on a sensitive feature that is common within the HIWEC.	• Low probability of spills of contaminants and limited magnitude of effects on surface water quality. Minor leaks or spills may occur. Application of mitigation and spill response measures are expected to avoid significant residual adverse effects. • After applying the identified mitigation, the effect is not significant.
Fish and Fish Habitat	• Effects on fish habitat (spills, water crossing)	• Minor; effect is a minor change compared to existing conditions.	• Minor; isolated to area at water crossing within the footprint of HIWEC.	• Minor; low in frequency and short in duration (days to weeks).	• Minor; effect is readily reversible over a short period of time.	• Minor to Moderate; effect may be on a sensitive feature that is common within the HIWEC.	• Low probability of spills of contaminants and limited magnitude of effects on surface water quality. Minor leaks or spills may occur. Application of mitigation and spill response measures are expected to avoid significant residual adverse effects. • Effects from water crossing repair and maintenance will be limited in magnitude, spatial extent, duration and permanence. • After applying the identified mitigation, the effect is not significant.

Table 6-7: Evaluation of Significance of Predicted Residual Effects – Operations

VEC	Residual Environmental Effects	Magnitude	Spatial Extent	Duration / Frequency	Permanence	Context	Significance Statement
Species at Risk Refer to **Appendix P** for a more detailed discussion of evaluation of significance of predicted residual effects for SAR.	• Change in mortality risk (including harm, harassment and / or killing of SAR)	• Moderate; proposed mitigation measures will limit mortality to SAR; however, even with these mitigations some mortality is still possible, particularly to bird and bat SAR. Federal legislation (i.e.; *SARA*) allows for killing or harming individual SAR with a permit. • Proposed mitigation measures will limit road mortality to snake and turtle SAR.	• Minor; change in mortality risk to SAR is possible within the HIWEC footprint.	• Minor; increase in mortality risk will occur during one (1) phase (operations), and mortalities are anticipated to occur infrequently.	• Minor; effect is reversible during the life of the HIWEC with the implementation of adaptive management measures.	• Moderate; overall effect is on sensitive feature (overall SAR populations) that is considered common within the study area and regionally. Kirtland's Warbler is a sensitive feature that is not common; however, the likelihood of mortality to this species is considered very low with the implementation of mitigation measures.	• The increased mortality of SAR related to the operations of the HIWEC may result in isolated SAR mortality. HIW is committed to developing a detailed monitoring and follow-up program for these species and, if required, will develop a compensation plan with EC-CWS based on the results of the monitoring and follow-up program. • After applying identified mitigation, monitoring, follow-up, and potential compensation the effect is not significant.
	• Change in behaviour	• Moderate; presence of humans and WTGs during operations may result in some change in behaviour compared to existing conditions.	• Moderate; change in SAR behaviour is possible within the study area.	• Moderate; change in SAR behaviour may occur during one (1) phase (operations). However, if it occurs, change in behaviour may occur frequently and for short durations.	• Minor; effect is reversible during the life of the HIWEC with the implementation of adaptive management measures.	• Moderate; overall effect is on sensitive feature (overall SAR populations) that is considered common within the study area and regionally. Kirtland's Warbler is a sensitive feature that is not common; however, the likelihood of a behavioural change to this species is considered very low with the implementation of mitigation measures.	• Disturbance effects to SAR are not anticipated to affect the viability and sustainability of populations within the study area or regionally. HIW is committed to developing a detailed monitoring and follow-up program for these species and, if required, will develop a compensation plan with EC-CWS based on the results of the monitoring and follow-up program. • After applying identified mitigation, monitoring, follow-up and potential compensation the effect is not significant.
Noise (as it relates to Land and Resources Used for Traditional Purposes by Aboriginal Persons; Local Residents, Cottagers and Businesses; and Recreation and Tourism VECs)	• Intermittent disturbance to current land users, local residents, cottagers, businesses, overnight accommodations and recreational activities due to noise from maintenance.	• Minor; maintenance noise effects will be limited to infrequent maintenance activities during operations, and therefore is a minor change.	• Minor; local effects within and / or near the HIWEC study area.	• Minor; operations maintenance activities will be infrequent for short durations.	• Minor; effect is reversible following the operations phase.	Minor; effect is on a common VEC.	• After applying identified mitigation, the effect is not significant.
	• Disturbance to current land users, local residents, cottagers, businesses, overnight accommodations and recreational activities due to noise from WTG operation.	• Minor; WTG noise will adhere to standards for similar wind farms in Ontario of <40 dBA at non-participating receptors which is a minor change to existing conditions.	• Moderate; effects primarily localized within and / or near the HIWEC, with some WTG noise audible at 1.5 km.	• Moderate; noise from the WTGs may be heard at nearby receptors intermittently throughout the operations phase.	• Minor; effect is reversible following the operations phase.	• Minor; effect is on a common VEC.	• After applying identified mitigation, the effect is not significant.
Visual Landscape (as it relates to Local Residents, Cottagers and Businesses, and Recreation and Tourism VEC)	• WTGs will be visible from various vantage points within and adjacent to the HIWEC study area.	• Minor to Moderate; presence of WTGs on the landscape can be viewed as positive, neutral or negative a change from existing conditions.	• Moderate; local effects within and / or near the HIWEC study area and visible beyond 10 km offshore of Georgian Bay.	• Major; WTGs will be visible throughout the operations phase.	• Moderate; effect is not reversible during the life of the HIWEC.	• Minor; effect is on a small number of local residents, cottagers and businesses surrounding the HIWEC study area and the visual character of the shoreline vegetation will be maintained. Furthermore, HIFN support for the HIWEC indicates that the visual changes fit within the context of their Reserve and treaty lands.	• Without mitigation, the effect is not significant.

Table 6-7: Evaluation of Significance of Predicted Residual Effects – Operations

VEC	Residual Environmental Effects	Magnitude	Spatial Extent	Duration / Frequency	Permanence	Context	Significance Statement
	• Potential avoidance of HIWEC overnight accommodations and recreational activities from changes to the visual landscape.	• Minor to Moderate; presence of WTGs on the landscape can be viewed as positive, neutral or negative a change from existing conditions.	• Moderate; local effects within and / or near the HIWEC study area and visible beyond 10 km offshore of Georgian Bay.	• Major; WTGs will be visible throughout the operations phase.	• Moderate; effect is not reversible during the life of the HIWEC.	• Minor; effect is on a small number of overnight accommodations surrounding the HIWEC study area and the visual character of the shoreline vegetation will be maintained. Furthermore, HIFN support for the HIWEC indicates that the visual changes fit within the context of their Reserve and treaty lands.	• Without mitigation, the effect is not significant.
Community Services and Infrastructure	• Increase in truck traffic where the south access road crosses Bekanon Road.	• Minor; increased truck traffic will be confined to access roads and the crossing is west of most residents along Bekanon Road and is a minor change from existing conditions due to low traffic volumes during operations.	• Minor; effect is within and / or near the HIWEC study area.	• Minor; effect is evident during operations and occurs infrequently for short durations.	• Minor; effect is reversible upon completion of HIWEC construction / decommissioning.	• Minor; effect is on a small number of residents using Bekanon Road.	• After applying identified mitigation, the effect is not significant.

6.5 Other Environmental Effects

6.5.1 Accidents and Malfunctions

Accidents or malfunctions are defined as those activities that result in unintentional negative consequences. Accidents or malfunctions could result from human activities undertaken during the construction / decommissioning phase or the operational phase.

Accidents and malfunctions are uncommon at modern industrial wind farms. Protection measures including implementation of a Spill Prevention and Response Plan, Erosion and Sediment Control Plan and WTG monitoring and maintenance program should further reduce the likelihood and magnitude of adverse environmental effects from accidents and malfunctions.

Construction / decommissioning and operations activities were reviewed to determine potential accidents and malfunctions associated with the HIWEC that could cause potential environmental effects. As required by the HIFN EA Guidance, this section provides an overview of possible accidents and malfunctions, which includes: an identification of the potential occurrences related to HIWEC activities, the mitigation measures to prevent or minimize the accidents and malfunctions, and response procedures if an accident occurs.

6.5.1.1 Construction / Decommissioning

Potential Effects and Mitigation

During the construction / decommissioning phase, potential accidents and malfunctions associated with the HIWEC include accidental discharges and spills, and equipment malfunction and fire. Precautions will be taken and mitigation measures applied to avoid these unlikely occurrences during construction / decommissioning of the HIWEC. Mitigation measures to minimize the potential for accidents and malfunctions are outlined below.

Accidental Discharges and Spills

Construction / decommissioning activities will not require storage of large quantities of fuels or other hazardous materials on-site; however, the Contractor may opt to have a fuel storage tank. Although fuel quantities are small there is the possibility for fuel or other hazardous substance spills associated with construction / decommissioning activities. Materials that could be accidentally spilled include relatively small quantities of fuel, oil, lubricants, grease, hydraulic fluids, cable installation fluid and concrete wash water associated with construction equipment maintenance and concrete pouring activity. Accidental spills could result in adverse environmental effects by contaminating: soils and terrain, groundwater, wildlife habitat, vegetation and ecological communities, surface water, fish and fish habitat, land and resources used for traditional purposes by Aboriginal persons.

Accidental discharges and spills could result in the following adverse environmental effects:

- Disturbance of vegetation and wildlife habitat;
- Reduced soil quality / quantity;
- Reduced water quality; and
- Disturbance to fish and fish habitat.

To mitigate the potential for spills, the fuel tank will have secondary containment (to capture any spilled fuel) and bollards to protect the tank from any vehicular impact. All fuels and hazardous material use will be subject to best management practices for fuel storage and handling. These will be documented in the Spill Prevention and

Response Plan. The Spill Prevention and Response Plan will, at a minimum, follow best management practices for spill response and will be completed in accordance with relevant provincial and federal standards. The Spill Prevention and Response Plan will be in place prior to initiation of construction / decommissioning activities to ensure that proper measures are applied should a spill occur including:

- Stopping all work in the area of a contaminant spill until the spill is cleaned up;
- Ensuring that spill control and contaminant equipment / materials are readily available on site;
- Having protocols for access to additional spill clean-up materials, if needed;
- Ensuring that contaminated materials are handled in accordance with relevant federal and provincial guidelines and standards;
- Having the MSDS which provides information on proper handling of chemicals readily available for the types of chemicals that will be used on-site;
- Providing proper training of operational staff on associated emergency response plan and spill clean-up procedures;
- Cleaning up spills as soon as possible, with contaminated soils removed to a licenced disposal site, if required;
- Restocking materials contained in spill clean-up kits as necessary;
- Analyzing any soil encountered during excavation that has visual staining or odours, or contains rubble, debris, cinders or other visual evidence of impacts to determine its quality in order to identify the appropriate disposal method; and
- Developing reporting procedures to meet federal, provincial and local requirements (e.g., reporting spills and verification of clean-up), and to include emergency contact and HIWEC management phone numbers.

The Contractor will be required to immediately contain the spill of any hazardous material upon discovery, unless the type of chemical is unknown. In this case, sampling would be required to ensure appropriate handling and disposal. Proposed mitigation for spills outlined under each applicable VEC will minimize adverse environmental effects from any potential spills.

Equipment Malfunction

In extreme cases, there could be potential failure or malfunction of WTGs during erection and / or construction equipment including excavators, backhoes, cranes, hoists, etc. Equipment and / or transmission line malfunction could result in the following adverse environmental effects:

- Disturbance or removal of vegetation and wildlife habitat;
- Reduced soil quality / quantity;
- Reduced water quality;
- Disturbance to fish and fish habitat; and
- Disturbance to land and resources used for traditional purposes by Aboriginal persons.

Equipment operation and infrastructure installation will be completed by skilled operators with appropriate experience for the task (e.g., crane operation). All equipment will be maintained at appropriate intervals, including checks as required to assess tire pressures, belts and hoses, fluid levels, and to identify mechanical defects or worn materials. In addition, WTG erection will only be completed when environmental considerations are favourable (i.e., low winds, no chance of lightning, little to no rainfall, etc.). Equipment malfunction that would result in adverse environmental effects is uncommon and the proposed mitigation measures further reduce the likelihood of a malfunction occurring.

Accidental Fires

There is the potential for accidental fires to occur during construction / decommissioning of the HIWEC. Fires could occur as a result of a spark from equipment malfunction, which could spread throughout the construction / decommissioning site. As a result, a fire could release emissions to the atmosphere, which could affect the vegetation and wildlife habitat, endanger wildlife and affect the ability of local and First Nation communities to use the areas within the study area.

To ensure accidental fires are controlled, the Contractor will be required to develop fire-protection measures in their Health and Safety Plan and include the types of fire suppression equipment, communications, notifications and reporting protocols and initial response procedures as may be required by provincial and federal agencies.

6.5.1.2 Operations

Potential Effects and Mitigation

During the operations phase, potential accidents and malfunctions associated with the HIWEC could include accidental discharges and fires. Precautions will be taken and mitigation measures applied to avoid these unlikely occurrences during operations of the HIWEC. Mitigation measures to minimize the potential for these accidents and malfunctions are outlined below.

Accidental Discharges and Spills

Potential accidental discharges and spills could occur as a result from transformers, spills from lubrication fluids, and release of petroleum hydrocarbons from vehicles conducting maintenance activities. Accidental spills could result in the following adverse environmental effects:

- Disturbance of vegetation and wildlife habitat;
- Reduced soil quality / quantity;
- Reduced water quality; and
- Disturbance to fish and fish habitat.

To mitigate these potential adverse environmental effects from accidental discharges and spills, the Contractor will implement and follow BMPs included in the Spill Prevention and Response Plan for operations. The Spill Prevention and Response Plan will be in place prior to initiation of operations activities to ensure that proper measures are applied outlined in **Section 6.5.1.1** above.

The operator will be required to immediately contain the spill of any hazardous material upon discovery, unless the type of chemical is unknown. In this case, sampling would be required to ensure appropriate handling and disposal.

General mitigation measures will also be applied to avoid soil and / or water contamination, such as:

- Ensure machinery is maintained free of fluid leaks;
- Undertake site maintenance, vehicle maintenance, vehicle washing and refuelling at least 30 m away from natural features (wetlands and / or waterbodies);
- Store any stockpiled materials at least 30 m away from wetlands and / or waterbodies;
- Store any potential contaminants (e.g., oil, fuels and chemicals) in designated areas using secondary containment, where necessary;

- All potentially hazardous materials to be stored in containment sites within the O&M building, within berms where possible;
- Keep ROW for access roads, collector lines /on-Reserve transmission lines and WTGs clear of garbage and debris; and
- Ensure machinery is maintained free of fluid leaks.

Accidental Fires

There is the potential for accidental fires to occur during the operations phase. Accidental fires could be caused by maintenance activities (where a flame is required) or caused by lightning. The Operator will have in the Health and Safety Plan the procedures should a fire be detected. To mitigate this effect, WTGs include heat and smoke detectors and a fire-suppression system. Fire extinguishers will be located on maintenance vehicles and fire response procedures will be developed and adhered to.

6.5.2 Effects of the Environment on the HIWEC

The following sections provide a description of potential effects of the environment on the HIWEC, including mitigation measures (where relevant).

6.5.2.1 Climatic Fluctuations

Global computer climate modeling indicates an increase in the variability of weather patterns, with an increase in average annual temperatures of 2 to 6°C projected by the end of the 21st Century, with a corresponding increase in annual precipitation amounts, number of hot days, number of severe storms and drought conditions (Riebeek, 2007).

An increase in annual temperature, number of hot days and drought events will not directly impact the operation of HIWEC. However, increased drought conditions may increase the potential for forest fires within the HIWEC study area. Large forest fires could damage the WTG facilities and require major replacement of facilities in an extreme event.

6.5.2.2 Extreme Events

Extreme events such as extreme wind, electric storms, heavy ice / snow and seismic events could potentially impact the HIWEC. The sections below are descriptions of the various extreme events that may potentially affect the HIWEC study area.

6.5.2.2.1 Extreme Winds

There is potential for extreme winds in the HIWEC study area. In this case, the rotor will stop moving when 10-minute average wind speeds exceed 25 m/s to avoid damage to the equipment. The design of the foundations and rock anchors will take into consideration high winds.

In the event of a tornado in the HIWEC study area, some infrastructure damage may occur and potentially impact the local landscape and habitat (e.g., vegetation damage, increased dust, etc.). Tornado events are temporary and the likelihood of such an event impacting the HIWEC is unlikely. As such, it is recommended to ensure proper and regular maintenance programs of the WTGs.

6.5.2.2.2 Electric Storms

There is potential for electric storms in the HIWEC study area. In the event of a thunderstorm, it is recommended that there be no personnel near a WTG. Should a WTG be struck by lightning, the WTG will automatically stop to minimize damage on the WTGs. The WTGs will be equipped with lightning protection and grounding to protect personnel and to avoid damage on the system.

6.5.2.3 Heavy Ice / Snow

Heavy ice / snow may potentially affect the HIWEC. Liquid precipitation, hail, humidity level and snowfall do not affect the WTGs. Snowfall levels are not expected to prevent access to the WTGs or to create significant amounts of downtime, as appropriate equipment and vehicles will be used. Severe snowstorms have the potential to result in operational impacts, such as snow accumulating in the gearbox and generator of the WTG causing damage to the equipment. Mitigation for snowfall and heavy ice is concentrated on effective snow / ice removal around the WTGs.

6.5.2.4 Seismic Events

Seismic events such as earthquake activity have the potential to result in significant damage to HIWEC. The HIWEC is not located in an area prone to severe earthquake events; however, the possibility for a minor earthquake is always present. The WTGs are designed to resist a certain level of earthquake and will not be affected. Mitigation measures are limited to proper and regular maintenance measures.

7. Environmental Protection Planning

An EPP will be prepared and implemented for the HIWEC. The EPP will outline mitigation measures that will be implemented to avoid or reduce potential environmental effects during construction / decommissioning of the HIWEC. It will also include management plans recommend during the EA of the HIWEC including:

- Traffic Management Plan;
- Waste Management Plan;
- Spill Prevention and Response Plan;
- Blasting Plan;
- Rehabilitation Plan;
- Weed Management Plan;
- Erosion and Sediment Control Plan;
- Construction Dewatering and Discharge Plan;
- Wildlife Management Plan;
- SAR Management Plan; and
- Archaeology and Cultural Resources Management Plan.

The EPP will be based on:

- HIFNs Land Code, Environmental Stewardship Regime, HIFN EA Guidance, and Environmental Protection Regime;
- Henvey Inlet Wind LPs Environmental Management System;
- Final EA Report;
- Permit conditions; and
- Professional experience.

The Contractor's Environmental Manager / Inspector will be responsible for implementing the EPP and will work with other resource specialists (e.g., licensed Archaeologists and qualified Biologists) where needed during construction / decommissioning environmental protection programs (i.e., construction and post-construction monitoring and reclamation).

8. Follow-up and Monitoring

8.1 Follow-up Program

The purpose of a follow-up program is *"for verifying the accuracy of the environmental assessment of a project, and determining the effectiveness of any measures taken to mitigate the adverse environmental effects of the project."* (CEA Agency, 2014). The HIWEC follow-up program will assist in determining if any further mitigation is required should the environmental effect continue to occur with proposed mitigation.

This EA predicts that, with the implementation of mitigation and adaptive management measures (in situations where monitoring indicates a need for additional mitigation), the HIWEC is not anticipated to have significant mortality effects on SAR or other wildlife including migratory birds. The issue of potential wildlife mortality is important to HIFN and other interested parties so a follow-up program is proposed to verify the accuracy of the EA and determine the effectiveness of mitigation measures.

The EA has identified wildlife habitat for multiple species including both common species (e.g. Moose and White-tailed Deer) as well as SAR (e.g., Massasauga Rattlesnake and Blandings Turtle) throughout the HIWEC Study Area. To verify the accuracy of the EA, the follow-up program (Wildlife Mortality Follow-up Program) will involve ongoing monitoring by environmental monitors and construction / operations / staff for any wildlife mortality associated with HIWEC activities during construction and operations. Environmental Monitors and construction / operations staff will be required to document any mortality caused by HIWEC activities including the expected cause of mortality during the construction and operation phase of the HIWEC. This will also include a tracking system developed and implemented for turtle, snake and SAR sightings as well as any wildlife mortality on access roads in order to inform adaptive management for mortality, if required, as described in the NHA: Environmental Impact Study Report (refer to **Appendix F4**). The staff member will take photos of the species for further review (e.g., to determine species, age, sex, etc.), if necessary, by a qualified Biologist.

Any wildlife mortality will be reported to the appropriate Environmental Lead (e.g., Environmental Manager for construction and operations) within 24 hours of discovery (specific reporting procedures will be outlined in the EPP). The Environmental Lead will be responsible for maintaining a detailed wildlife mortality tracking system identifying the species affected, age / sex of the individual (where possible), location, date, time, causes of mortality and any actions to reduce the likelihood of additional mortality. Every time an incident has been reported, the Environmental Lead along with a qualified Biologist will review all information and determine if corrective action should be taken to reduce any further mortality risk.

The purpose of documenting and reporting wildlife mortality is to create a tracking system that will be used confirm EA accuracy including the effectiveness of mitigation and trigger adaptive management measures if current mitigation is not proving effective. The adaptive management plan will include specific thresholds to trigger additional mitigation based on the results of follow-up mortality monitoring. Adaptive management measures to address wildlife mortality will be documented in the EPP and may include any potential recommendations from EC-CWS identified during the *SARA* permitting process but could include (but not limited to):

- Installing additional wildlife passages in areas of documented mortality;
- Adding additional vehicle controls (e.g. signage or speed bumps); and
- Adjust timing of activities to further avoid sensitive periods where possible.

The data and results of the Wildlife Mortality Follow-up Program will be documented every 6 months starting at construction commencement and then annually for two (2) years post construction. A report documenting the

results of the Wildlife Mortality Follow-up Program will be provided to HIFN and EC-CWS one month after each six (6) month period starting at construction commencement and then one (1) month after each yearly period during post-construction.

During operation, a follow-up bird and bat mortality monitoring program will be implemented following the relevant federal and provincial guidelines for wind projects in Ontario as outlined in the EEMP (refer to **Appendix G**). Therein, three (3) years of post-construction mortality monitoring for bats and birds (including migratory birds and SAR) in conjunction with two (2) years of post-construction disturbance effects monitoring at specified wildlife habitats will be conducted. The EEMP has been developed in accordance with mortality monitoring guidance for wind farms in Ontario including specific mortality thresholds. In the event that a mortality threshold is exceeded, the proponent will consider operational mitigation to address mortality in excess of thresholds (e.g. changes in cut-in speed, selective shutdown of specific turbines at key times of year or under certain weather conditions) during periods of high mortality. Any mortality documented through the EEMP will be included in the overall wildlife mortality tracking system discussed above.

8.2 Monitoring Program

Monitoring is completed during construction / decommissioning and operations (post-construction). The purpose of the construction / decommissioning monitoring program is to:

- Confirm that construction / decommissioning activities are being undertaken as per EA requirements, contract documents (including drawings, plans and specifications), permit requirements and best management practices;
- Confirm that mitigation measures are being installed as defined in this EA and applicable permits;
- Verify that construction activities and / or mitigation measures are not creating unintended, adverse environmental effects (e.g., if proposed sediment control measures are not providing the desired level of environmental protection, work affecting that aspect of the environment is to be stopped until the deficiency is corrected);
- Identify the need for corrective or alternate mitigation measures; and
- Provide a record of the construction / decommissioning process which typically includes weekly reports detailing progress, issues and actions taken to resolve those issues by the Environmental Monitor.

Monitoring programs to confirm the implementation of mitigation measures during construction / decommissioning and operation, as well as compliance with the commitments in this EA and any other permitting commitments made to date, are documented throughout **Section 6** and in the discipline specific appendices including the Natural Heritage Assessment – Environmental Impact Study Report (**Appendix F4**), Water Assessment and Waterbody Report (**Appendix H**) and Hydrogeological Assessment (**Appendix J**). Details on the monitoring for SAR are also provided in **Table 8-1.**

Table 8-1: SAR Follow-up and Monitoring

Species at Risk	Monitoring
Avin SAR • Canada Warbler • Common Nighthawk • Kirtland's Warbler • Olive-sided Flycatcher • Eastern Whip-poor-will	**Construction / Decommissioning** • If vegetation trimming is to occur within the bird nesting season (April 1 to August 31), a qualified Biologist will complete a nest and nesting activity survey immediately prior to vegetation maintenance. ▪ Nest surveys will be conducted in simple habitat (as defined under mitigation measures) and will include searching around the general vicinity of areas proposed for vegetation removal, including within 10m. Nesting activity will be documented when it consists of confirmed breeding evidence, as defined by OBBA criteria (OBBA 2001): ▪ Distraction display or injury feigning ▪ Used nest or egg shell found (occupied/laid this season); ▪ Recently fledged young or downy young; ▪ Adults leaving or entering nest site in circumstances indicating occupied nest; ▪ Adult carrying faecal sac; ▪ Adult carrying food for young; ▪ Nest containing eggs; or ▪ Nest with young seen or heard. ▪ A qualified Biologist will conduct an area search of the proposed blasting area to ensure no SAR birds or nests are present the day of blasting, as close to the blasting time as safety considerations will allow. ▪ During the breeding bird season (April 1 to August 31), all maintenance and biological crews will consist of two people, one of which will be a wildlife spotter trained to identify SAR birds that may be roosting or nesting on the road and will enforce speed limits on all access roads. Should any mortality occur outside in areas where speed bumps have not already been installed, consideration will be given to installing additional speed bumps or speed limit signs in the immediate vicinity of areas of SAR mortality. ▪ The Environmental Construction Monitor will ensure the species observation log is kept up to date, procedures are followed and reporting is submitted to EC-CWS, as required. ▪ Daily monitoring of areas where active vegetation removal is occurring will be conducted by the Environmental Construction Monitor. Regular environmental construction monitoring and routine inspections will be undertaken to ensure vegetation removal occurs within the delineated construction footprint. ▪ An Environmental Construction Monitor will be present during all blasting activities to ensure that blasting occurs in areas where vegetation has already been cleared and ensuring blast mats are used appropriately control debris generated from blasting. **Operations** ▪ Conduct 3 years of post-construction bird mortality monitoring following *Birds and Bird Habitats: Guidelines for Wind Power Projects* (OMNR 2011b). ▪ A report outlining the methods employed and the results of monitoring will be prepared and submitted to EC-CWS on an annual basis to determine if additional monitoring and/or mitigation measures are warranted. Consider changes in turbine operations (e.g., changes in cut-in speed, selective shutdown of specific turbines at key times of year or under certain weather conditions) during periods of high mortality. ▪ Conduct the following post-construction bird disturbance monitoring for 2 years: ▪ Pre-construction breeding bird surveys completed in 2015, as well as 12 other representative sites at varying distances from the HIWEC location, will be repeated annually for 2 years post-construction to ensure similar species abundance and diversity continue to be found in the HIWEC study area. ▪ Pre-construction crepuscular bird surveys completed in 2015 will be repeated annually for 2 years post-construction to ensure similar species abundance and diversity continue to be found in the HIWEC study area. ▪ In the event that, after 2 years, breeding bird surveys indicate notable changes in bird abundance or species diversity, EC-CWS will be consulted to determine if additional mitigation measures are warranted through an adaptive management approach. Specific details of the adaptive management framework will be developed in consultation with EC-CWS during the permitting phase and documented in the Environmental Protection Plan. ▪ Monitoring of the rehabilitation activities will be completed annually for the first 3 years to ensure vegetation is established. If, after 3 years, vegetation has not established, additional rehabilitation activities will be undertaken in areas that remain deficient of established vegetation.

Table 8-1: SAR Follow-up and Monitoring

Species at Risk	Monitoring
Turtle SAR • Blanding's Turtle • Eastern Musk Turtle	**Construction / Decommissioning** ▪ Daily monitoring of areas where active vegetation removal is occurring will be conducted by Environmental Construction Monitor to ensure vegetation removal is occurring from within the delineated boundaries of the construction footprint. ▪ An Environmental Construction Monitor will be present during blasting activities to ensure that blasting is occurring in areas where vegetation has already been cleared and ensuring blast mats are used appropriately control debris generated from blasting. ▪ Changes to wetland water levels and / or water quality prior to, and post completion of construction will be monitored to assess the impacts of dewatering activities in accordance with the Detailed Water Taking Assessment. ▪ In the rare case where construction was initially designed to avoid an area and exclusionary fencing had not been installed prior to the turtle nesting period, a qualified Biologist experienced in working with turtles will complete area searches immediately prior to construction to identify any potential nesting areas and nesting activity during the turtle nesting/hatching period of June 1 to September 15 (GBBR date unknown). ▪ Between June 1 and September 15, a qualified Biologist will search the area of disturbance immediately prior to vegetation clearing occurring between June 1 and September 15 to ensure no nests are present. ▪ If any confirmed, or suspected, turtle nests are identified within the vicinity of the HIWEC location, nest monitoring will be conducted twice per week during the construction and decommissioning phases to monitor the success of the nest and ensure its protection from construction impacts. Surveys will be completed during the turtle nesting/hatching season between June 1 and September 15. ▪ Between April 15 and September 30, a qualified Biologist will conduct an area search of the proposed blasting area to ensure no SAR turtles or nests are present. ▪ Road mortality surveys will be conducted twice a week from April 1 to October 31 during the construction and decommissioning phases to monitor the effectiveness of ecopassages/designated movement corridors and turtle mortality rates. ▪ Motion-sensor cameras will be installed within each ecopassage in an effort to quantify movement activities and species use of the ecopassages. Motion-sensor cameras will be checked regularly during the active period for turtles (April 15 to September 30) when construction is occurring. ▪ All construction staff will be required to report to the Environmental Monitor any SAR turtle mortality or turtle activity on roads, as per the Sighting Response Protocol**.** The Environmental Construction Monitor will ensure the species observation log is kept up to date, procedures are followed and reporting is submitted to EC, as required. ▪ Any documented road mortality of a SAR turtle species will trigger consideration of contingency measures and adaptive management. **Operations** ▪ Monitoring of the rehabilitation activities will be completed annually for the first 3 years to confirm vegetation has established. If, after 3 years, vegetation has not established, additional rehabilitation activities will be undertaken in areas that remain deficient of established vegetation. ▪ To assess the use of six (6) artificial nesting mounds by turtles, monitoring will be completed through the use of strategically placed wildlife (game) cameras. These cameras should activated by a motion-sensor and be able to record still or video evidence during daylight or nighttime (i.e. infrared) hours. Cameras should be left in place for the entire period of May 1 to September 30, and data will be revised at a minimum of weekly during the nesting period (May 15-June 30) and monthly during the remainder of the monitoring season (July 1 to September 30. In the event that nesting activity is documented, CWS will be engaged to determine whether additional efforts should be taken to protect nests from predation. ▪ Prior to monitoring of artificial nest mounds, visual inspections will occur prior to May 1 to ensure it is suitable for turtle nesting activity. If modifications are required, these will be completed prior to the nesting period (May 15-June 30). ▪ Monitoring of artificial nest mounds will begin at the installation and will continue until the completion of the third year that the HIWEC is operational. ▪ During the active turtle period (April 15-Septmeber 30) all maintenance and biological crews will consist of two people, one of which will be a wildlife spotter trained to identify SAR turtles that may be on or near the road and will enforce speed limits on all access roads.

Table 8-1: SAR Follow-up and Monitoring

Species at Risk	Monitoring
	▪ Road mortality surveys will be conducted twice a week from May 1 to October 31 for a minimum of two years post-construction to monitor turtle mortality rates and the effectiveness of mitigation measures (e.g. ecopassages, speed limits, speed bumps and wildlife crossing signs). ▪ Motion-sensor cameras will be installed within each ecopassage in an effort to quantify movement activities and species use of the ecopassages. Motion-sensor cameras will be checked regularly from May 1 to October 31 for the first 3 years that the HIWEC is operational ▪ All operations staff will be required to report any SAR turtle mortality or turtle activity on roads to the appropriate staff. Operations staff to ensure the species observation log is kept up to date and that procedures are followed. ▪ Inspections of ecopassages will occur (once in early spring after snow melt and once in summer/fall) during road mortality surveys for a minimum of two years post-construction. ▪ Any documented road mortality of a SAR turtle species will trigger consideration of contingency measures and adaptive management. ▪ If any confirmed turtle nests are identified within the vicinity of HIWEC location, nest monitoring will be conducted twice times per week during the operational phase to monitor the success of the nest and ensure its protection from operational impacts. Surveys will be completed during the turtle nesting/hatching season between June 1 and September 15. ▪ Pre-construction herpetofauna surveys completed in 2015 will be repeated annually for 2 years post-construction to ensure similar species abundance and diversity continue to be found in the areas of the HIWEC study area. Turtle monitoring will be conducted following methodology used in pre-construction surveys unless otherwise required through consultation with the appropriate agencies. The 2-year report will be provided to EC-CWS to determine if additional monitoring and/or mitigation measures are warranted.
Snake SAR • Eastern Foxsnake • Massasauga Rattlesnake • Eastern Hog-nosed Snake	**Construction / Decommissioning** ▪ Daily monitoring of areas where active vegetation removal is occurring will be conducted by Environmental Construction Monitor to ensure vegetation removal is occurring from within the delineated boundaries. ▪ An Environmental Construction Monitor will be present during blasting activities to ensure that blasting is occurring in areas where vegetation has already been cleared and ensuring blast mats are used appropriately control debris generated from blasting. ▪ Changes to wetland water levels and / or water quality prior to, and post completion of construction will be monitored to assess the impacts of dewatering activities in accordance with the Detailed Water Taking Assessment. ▪ During the active period for snakes, from April 15 to September 30 (GBBR date unknown), a Rattlesnake Monitor will complete area searches immediately prior to all vegetation removal and blasting to ensure no SAR snakes are present. ▪ Road mortality surveys will be conducted twice a week from April 1 to October 31 during the construction and decommissioning phases to monitor the effectiveness of ecopassages/designated movement corridors and snake mortality rates. ▪ Motion-sensor cameras will be installed within each ecopassage in an effort to quantify movement activities and species use of the ecopassages. Motion-sensor cameras will be checked regularly during the active period for snakes (April 15 to September 30) when construction is occurring. ▪ All construction staff will be required to report to the Environmental Monitor any SAR snake mortality or snake activity on roads, as per the Sighting Response Protocol**.** The Environmental Construction Monitor will ensure the species observation log is kept up to date, procedures are followed and reporting is submitted to EC, as required. ▪ Any documented road mortality of a SAR turtle species will trigger consideration of contingency measures and adaptive management. **Operations** ▪ Monitoring of the rehabilitation activities will be completed annually for the first 3 years to confirm vegetation has established. If, after 3 years, vegetation has not established, additional rehabilitation activities will be undertaken in areas that remain deficient of established vegetation. ▪ Rock debris from blasting will be used to create 12 gestation, basking and retreat sites for Massasauga Rattlesnake. Each site will be added as a snake monitoring location and will be assessed following the same methods, frequency and for the same duration as the post-construction monitoring behaviour surveys.

Table 8-1: SAR Follow-up and Monitoring

Species at Risk	Monitoring
	▪ Visual inspections will occur prior to May 1 to ensure the constructed gestation sites are suitable for snake nesting activity. If modifications are required, these will be completed prior to the nesting period (May 15-June 30). ▪ During the active snake period (April 15-Septmeber 30) all maintenance and biological crews will consist of two people, one of which will be a wildlife spotter trained to identify SAR snakes that may be on or near the road and will enforce speed limits on all access roads. ▪ Road mortality surveys will be conducted twice a week from May 1 to October 31 for a minimum of two years post-construction to monitor snake mortality rates and the effectiveness of mitigation measures (e.g. ecopassages, speed limits, speed bumps and wildlife crossing signs). ▪ Motion-sensor cameras will be installed within each ecopassage in an effort to quantify movement activities and species use of the ecopassages. Motion-sensor cameras will be checked regularly from May 1 to October 31 for the first 3 years that the HIWEC is operational ▪ All operations staff will be required to report any SAR snake mortality or snake activity on roads to the appropriate staff. Operations staff to ensure the species observation log is kept up to date and that procedures are followed. ▪ Any documented road mortality of a SAR turtle species will trigger consideration of contingency measures and adaptive management. ▪ Inspections of ecopassages will occur (once in early spring after snow melt and once in summer/fall) during road mortality surveys for a minimum of two years post-construction. • Pre-construction herpetofauna surveys completed in 2015 will be repeated annually for 2 years post-construction to ensure similar species abundance and diversity continue to be found in the areas of the HIWEC study area. Snake monitoring will be conducted following methodology used in pre-construction surveys unless otherwise required through consultation with the appropriate agencies. The 2-year report will be provided to EC-CWS to determine if additional monitoring and/or mitigation measures are warranted.
Bat SAR • Little Brown Bat • Northern Myotis • Tri-coloured Bat	**Construction / Decommissioning** ▪ Daily monitoring of areas where active vegetation removal is occurring will be conducted by the Environmental Construction Monitor. Regular environmental construction monitoring and routine inspections will be undertaken to ensure vegetation removal occurs within the delineated construction footprint. ▪ Any trees proposed for removal, and any rock crevices in areas proposed for blasting during the bat roosting season (April 30 to September 1) will be searched for signs of maternity roosts by a qualified Biologist prior to any construction activities that may affect the habitat. Searches may be visual or may require exit surveys at dusk where signs of occupancy are noted or habitat provides ideal roost characteristics. ▪ An Environmental Construction Monitor will be present during all blasting activities to ensure that blasting occurs in areas where vegetation has already been cleared and ensuring blast mats are used appropriately control debris generated from blasting. ▪ A qualified Biologist will conduct an area search of rock crevices proposed for blasting between April 30 to September 1 to ensure no SAR bats are present. ▪ The Environmental Construction Monitor to ensure the species observation log is kept up to date, procedures are followed and reporting is submitted to EC, as required. **Operations** ▪ Monitoring of the rehabilitation activities will be completed annually for the first 3 years to ensure vegetation is established. If, after 3 years, vegetation has not established, additional rehabilitation activities will be undertaken in areas that remain deficient of established vegetation. ▪ A total of ten (10) artificial roosting structures (bat houses and / or artificial bark) that is established within HIFN I.R. #2 will be monitored for signs of use at least twice per year for the first 3 years after installation, with surveys once in each of May and June. These surveys can occur at any time of day and will utilize flashlights or low-light cameras to look for occupancy. Other signs, such as guano, will also be considered while determine occupancy. If any sign of occupancy is noted, an evening survey* will be completed, combining the use an ultrasound detector with visual observations to collect information on both abundance and species.

Table 8-1: SAR Follow-up and Monitoring

Species at Risk	Monitoring
	▪ Conduct 3 years of post-construction bat mortality monitoring following *Bats and Bat Habitats: Guidelines for Wind Power Projects* (OMNR 2011a). Monitoring will occur at a minimum frequency of monthly visits to each turbine, from May to September during Years 1-3 and every 5 years thereafter (i.e. Year 8, 13, etc.). The adaptive approach outlined in the plan increases monitoring frequency upon encountering a bat SAR mortality to better characterize the potential impacts at that specific turbine and take further adaptive approaches, if necessary. ▪ If vegetation trimming is to occur within the bat roosting season (April 30 to September 1), a qualified Biologist will search each tree for signs of a bat roost prior to vegetation maintenance. ▪ All operations staff will be required to report any SAR bat mortality or bat activity to the appropriate staff. Operations staff to ensure the species observation log is kept up to date and that procedures are followed. ▪ Pre-construction bat acoustic monitoring surveys completed in 2011 will be repeated annually for 2 years post-construction to ensure similar species abundance and diversity continue to be found in the HIWEC study area. The 2-year report will be provided to EC-CWS to determine if additional monitoring and/or mitigation measures are warranted. **The completion of visual evening surveys will subject to Health and Safety considerations for completing evening monitoring. Alternate approaches, including low-light video cameras, will be considered, where reasonable*

9. Consultation Summary

9.1 Overview of the HIWEC Consultation Program

HIW undertook a consultation program in accordance with the HIFN EA Guidance requirements, which began in January 2015 and continued through to the submission of the Final Draft EA Report in September 2015. HIW has maintained continuous communication with stakeholders, which includes HIFN, the public, other Aboriginal communities, local municipalities, government agencies and other stakeholder / interest groups, throughout the planning process and will continue this dialogue throughout the lifecycle of the HIWEC.

This section provides a summary of the communication tools used, and the consultation activities undertaken, as part of the EA consultation program, and describes how input received on the HIWEC has been incorporated in the planning process. Additional details regarding the EA consultation program is documented in the Consultation Report included as **Appendix I**.

9.2 Henvey Inlet First Nation Environmental Assessment Guidance Instrument Consultation Requirements

Section 3.3.5 and **Appendix A** of the HIFN EA Guidance describes the requirements for consultation and for documenting the results of the EA process. The following sections describe key requirements outlined in the HIFN EA Guidance as they relate to consultation with HIFN, other Aboriginal communities, the public and local municipalities.

Although the HIFN EA Guidance does not prescribe consultation activities with government agencies (outside of local municipalities) or other stakeholder / interest groups (such as cottagers' associations), HIW has included consultation with these parties as part of the consultation program as best practice.

9.2.1 Consultation with Henvey Inlet First Nation and the Public

The HIFN EA Guidance states that HIW must consult with HIFN Council and the community as well as the public at key stages of the EA process for the HIWEC. In addition, HIW must establish and maintain a website that provides direct electronic access to a registry of Designated Environmental Assessment Records and a complete index of such Records. HIW must also establish and maintain a repository of all relevant EA records received. On request, HIW will provide reasonable access to any record in the repository.

For the purposes of community consultation on the HIWEC, HIW must provide community and public notices, host community meetings on-Reserve, host public meetings off-Reserve, and provide opportunities for the community and public to comment. In developing a consultation plan, HIW considered the steps set out in **Table 9-1** below from the HIFN EA Guidance.

Table 9-1: Henvey Inlet Wind Energy Centre Consultation Steps

Step	Action
1	Distribute a Notice to Engage, briefly describing the Energy Centre and mapping its location. Post Notice to the electronic registry within ten (10) days of distribution.
2	Distribute a Notice of First Community Meeting and a Notice of First Public Meeting. Post the notice and the EA Description Report to the electronic registry within ten (10) days of distribution.
	A community meeting shall be held on the HIFN Reserve after these documents are distributed. A meeting of members of the public who are within the zone of potential impacts of the Energy Centre shall be held off-Reserve also within a reasonable time after these documents are distributed.

Table 9-1: Henvey Inlet Wind Energy Centre Consultation Steps

Step	Action
3	Distribute the Notice of a Second Community Meeting and a Notice of a Second Public Meeting. Post this Notice and any available preliminary draft (Interim Draft) of some or all parts of the EA report (**Volume A**) and supporting documents to the electronic registry and shall provide a period of not less than 30 days for the community and public to provide written comments on the available preliminary draft documents.
	Hold a second community meeting on the HIFN Reserve no earlier than a reasonable time after these documents are distributed. Host a second public meeting off-Reserve no earlier than a similar reasonable time after these documents are distributed.
4	At or around the time of submitting the draft EA report (**Volume A**) (including supporting documents) to Council, post some or all completed documents on the electronic registry as soon as they are completed.
	Prepare a report to Council summarizing the community and public comments and post this report to the electronic registry.
5	On submission to Council, post the Final EA Report (and supporting documents) to the electronic registry.

9.2.2 Engagement with Other Aboriginal Communities

HIW understands the importance of ensuring other Aboriginal communities in close proximity to the HIWEC study area are fully aware of the HIWEC and have no concerns with the undertaking. HIFN Chief, Chief Wayne McQuabbie, has been engaging in ongoing dialogue with other local Chiefs or their predecessors (including Chief Denise Restoule of Dokis First Nation, Chief William Diabo of Magnetawan First Nation and Chief Wayne Pamajewon of Shawanaga First Nation) about the HIWEC since 2008. To date, no concerns with the HIWEC have been raised by these surrounding Aboriginal communities.

The general formal consultation mechanisms used during the HIWEC EA planning process (such as the distribution of notices and invitation to information centres) were not extended to the surrounding Aboriginal communities due to the nature of the activities occurring entirely within HIFN lands on-Reserve, as well as the more personal approach to engagement undertaken by Chief McQuabbie described above. Together, Magnetawan First Nation, Shawanaga First Nation and HIFN have many shared interests within the region, and regularly discuss these interests together to keep informed.

9.2.3 Consultation with Government Agencies and Other Stakeholder / Interest Groups

HIW is committed to promoting active participation that goes beyond the HIFN EA Guidance requirements and ensuring there is ongoing communication with all affected and interested parties throughout the course of the EA planning process. Though not a requirement of the HIFN EA Guidance, in addition to local municipalities, HIW identified the government agencies and other stakeholder / interest groups potentially interested in the HIWEC at the commencement of the study. These included:

- Local municipalities;
- Federal agencies;
- Provincial agencies;
- Cottagers' and ratepayers' associations;
- Service providers;
- Environmental organizations;
- Recreational organizations;
- An emergency department; and
- A forestry management company.

A detailed list of these agencies is provided in **Appendix I**.

9.3 Henvey Inlet Wind Energy Centre Consultation Objectives

The communication and engagement objectives of the HIWEC consultation process are to:

- Undertake consultation early in the planning process and continue throughout the construction, operations and decommissioning phases of the HIWEC;
- Identify potentially interested individuals and groups and the nature of their interests;
- Obtain data and identify issues associated with the HIWEC;
- Inform HIFN, other Aboriginal communities, the public, local municipalities, government agencies, and all other stakeholder / interest groups of all relevant information about the HIWEC and how the HIWEC might affect the physical, natural, social and economic environment in the community and surrounding areas; and
- Track and document all consultation activities and communications to ensure all comments and questions are considered in the planning of the HIWEC.

9.4 Communication Tools and Consultation Activities

Table 9-2 provides a description of the tools, mechanisms and activities associated with carrying out meaningful communication and consultation during the EA process for the HIWEC.

Table 9-2: Communication Tools and Consultation Activities

Tool / Activity	Description of Communication Tool / Consultation Activity
HIWEC Contact List	• A contact list was created early in the planning of the HIWEC to identify all parties potentially interested in the HIWEC. The contact list includes the following groups: ▪ HIFN; ▪ The public including property owners within 550 m from the HIFN I.R. #2 boundary and individuals who expressed interest in the HIWEC; ▪ Local municipalities; ▪ Relevant federal and provincial government agencies and elected officials; ▪ Other stakeholder / interest groups; and ▪ Interested members of the public and agencies engaged during past consultation activities (between 2008 and 2014) requesting to be kept informed of the HIWEC throughout planning and development. • The contact list was updated and revised, as appropriate, to reflect those individuals and agencies who did not wish for further involvement in the EA, as well as those new individuals and agencies who wished to be directly notified of future events.
HIWEC Tracking Database	• A tracking database was used to track all correspondence the HIW team had with HIFN, other Aboriginal communities, the public, local municipalities, government agencies, and all other stakeholders / interest groups. All letters, emails, and telephone calls received and responses provided were tracked and recorded to provide an accurate account of all communication exchanged during the EA process.
HIW Website	• A website (www.henveyinletwind.ca) was created in November 2014. The HIW website currently hosts: ▪ General information about HIW and its composition; ▪ An overview of the HIWEC; ▪ Economic and environmental benefits of the HIWEC; ▪ Documentation including notices and reports; ▪ Resources; ▪ An opportunity to sign-up to a mailing list to receive newsletter updates; and ▪ General contact information. • The website continues to act as the hub for all HIWEC-related information and provides an opportunity for those interested in the HIWEC but who are unable to attend live events to still feel included and involved in the information sharing process. Individuals who are interested in receiving updates on the HIWEC are also able to register to receive notices via email and / or mail.

Table 9-2: Communication Tools and Consultation Activities

Tool / Activity	Description of Communication Tool / Consultation Activity
HIW Phone and Email	• A dedicated phone number (705-857-5265) and email address (info@henveyinletwind.com) were created for the HIWEC and are used as key communication tools encouraging all interested parties to contact the HIW team with questions and / or comments at any time during the EA process. The phone number and email address help to facilitate comments and questions to be responded to by the HIW team and added to the consultation records.
HIW Office	• An HIW office was set-up at the same location as the HIFN Band Office – 295 Pickerel River Road, Pickerel, Ontario. The office is open from 8:30 a.m. to 4:30 p.m. Monday to Thursday and 8:30 a.m. to 12:00 p.m. on Fridays to allow HIFN Band Members or other interested individuals to drop in to speak about the HIWEC. HIWEC materials such as reports and notices are available for review and a HIW representative is available to speak with individuals about the HIWEC.
Notifications	• Notices were used to provide information about the HIWEC at key milestones during the EA process. • Notifications were provided via email and / or Canada Post mail, newspapers, the HIW website, and radio advertisements. • The following notices were distributed during the EA process: ▪ Notice of Commencement of Environmental Assessment and Invitation to Information Centre #1 (January 2015); ▪ Notice of Information Centre #2 (June 2015); and ▪ Notice of Study Completion and Final Draft EA Report (September 2015).
Information Centres	• Two (2) rounds of information centres were held for the HIWEC; the first in February 2015 and the second in July 2015. These were scheduled to occur at key points in the EA process in order to offer HIFN and the public at large an opportunity to learn and provide their input into the planning and assessment phase of the HIWEC. Each round of information centres included two (2) types of meetings; one (1) meeting specifically for HIFN (i.e., Community Information Centre (CIC)) and another for the public, local municipalities, government agencies and other stakeholder / interest groups (i.e., Public Information Centre (PIC)). At each information centre, information boards and roll-out maps were on display and representatives from the HIW team were available to answer questions and discuss concerns with attendees. Comment forms were offered at each information centre to attendees to submit comments and concerns about the HIWEC. All of the information centres, with the exception of CIC #2, followed an open house format. CIC #2 included a dinner and presentation followed by a question and answer period. *Information Centre #1* The first round of information centres were held in February 2015. The purpose of these meetings was to: ▪ Introduce the HIWEC; ▪ Provide an overview of the approach to planning and EA process; ▪ Provide an opportunity for attendees to meet members of the HIW team; ▪ Provide an update on the work and studies completed to date; ▪ Answer questions about the HIWEC; and ▪ Obtain input for consideration in the planning and design of the HIWEC. CIC #1 was held on February 24, 2015 at the HIFN I.R. #2 Fire Hall. PIC #1 was held on February 25, 2015 at the Holy Family Church Parish Hall. *Information Centre #2* The second round of information centres were held in July 2015. The purpose of these meetings was to: ▪ Provide an update on the HIWEC, and discuss the layout and EA process; ▪ Provide an opportunity for attendees to speak with members of the HIW team; ▪ Share the results of the studies and investigations completed to date; ▪ Receive feedback on the Interim Draft EA Report; ▪ Answer questions about the HIWEC; and ▪ Obtain input for consideration in the planning and design of the HIWEC. PIC #2 was held on July 25, 2015 at the Britt Legion. CIC #2 was held of July 26, 2015 at the HIFN I.R. #2 Fire Hall.
Individual Meetings	In some cases, HIW held individual meetings to ensure all parties were adequately engaged and their questions and concerns addressed throughout the planning process. These included meetings with government agencies (such as the EC-CWS) and meetings with cottagers and cottagers' associations (such as the Key River Area Association (KRAA)).

9.5 Publication of Environmental Assessment Reports and Supporting Documents

During the EA process, several reports were made available for review and comment. These reports included the HIWEC Pre-Interim Draft Report (Description Report), the Interim Draft EA Report and the Final Draft EA Report.

9.5.1 Pre-Interim Draft Report

The HIWEC Description Report was made available for review and comment at the time that the Notice of Study Commencement and Invitation to Information Centre #1 was distributed to HIFN, the public, local municipalities, government agencies and other stakeholder / interest groups. The HIWEC Description Report described:

- The HIWEC and its components;
- An overview of the construction, operations and maintenance, and decommissioning phases of the HIWEC; and
- Existing conditions of valued ecosystem components and preliminary environmental effects.

This report was posted on the HIWEC website and made available at the Britt Public Library and the HIWEC office from January 23, 2015 to March 16, 2015. Copies of the report were also available at CIC #1 and PIC #1.

9.5.2 Interim Draft Environmental Assessment Report

The Interim Draft EA Report included the following:

- HIWEC Environmental Assessment;
- HIWEC Description Report;
- HIWEC Construction Plan Report;
- HIWEC Design and Operations Report;
- HIWEC Decommissioning Report; and
- HIWEC Stage 1 Archaeological Assessment.

The reports were made available for comment and review at the time that the Notice of Information Centre #2 was distributed to HIFN, the public, local municipalities, government agencies and other stakeholder / interest groups. The reports were posted on the HIWEC website on June 25, 2015, 30 days prior to PIC #2. Copies of the reports were also available at CIC #2 and PIC #2. HIFN, the public, local municipalities, government agencies and other stakeholder / interest groups were notified of the availability of these reports and encouraged to review and comment on them. The comment period for the EA reports ended on August 1, 2015 to provide sufficient time for the HIW team to consider and incorporate feedback into this Final Draft EA Report.

9.5.3 Final Draft Environmental Assessment Report

On September 30, 2015, **Volume A** was made available for review and comment to HIFN, the public, local municipalities, government agencies and other stakeholder / interest groups. At the time, **Volume A** was comprised of the Final Draft EA Report and the following Appendices:

- HIWEC Description Report;
- HIWEC Construction Plan Report;
- HIWEC Design and Operations Report;

- HIWEC Decommissioning Plan Report;
- HIWEC Wind Turbine Specifications Report;
- HIWEC Natural Heritage Assessment Records Report;
- HIWEC Natural Heritage Assessment Site Investigations Report;
- HIWEC Natural Heritage Assessment Evaluation of Importance Report;
- HIWEC Natural Heritage Assessment Environmental Impact Study;
- HIWEC Environmental Effects Monitoring Plan;
- HIWEC Water Assessment and Waterbody Report;
- HIWEC Consultation Report;
- HIWEC Hydrogeological Assessment and Effects Assessment Report;
- HIWEC Archaeological Assessments;
- HIWEC Heritage Assessment Report; and
- HIWEC Noise Impact Assessment.

These documents were made available with the release of the Notice of Study Completion and Review of Final Draft EA Report. The documents were posted on the HIWEC website and hard copies were made available at the Britt Public Library and the HIW office from September 30, 2015 to October 30, 2015.

The comment period for **Volume A** ended on October 30, 2015. Feedback received during the review and comment period was considered and is presented to the HIFN Band Council as part of the Final EA Report.

9.6 Consideration of Feedback Received during the Environmental Assessment Process

This section provides a summary of questions and comments received from HIFN and the public. It also provides corresponding responses by HIW to illustrate how feedback was considered during the EA process. The comments and questions provided below were received during the information centres (both verbal and via completed comment forms), as well as from emails and phone calls to the HIW team.

As previously stated, in addition to consulting with HIFN and the public, HIW has been in communication with local municipalities, government agencies and other stakeholder / interest groups since the commencement of the EA process. A complete list of these stakeholders and detailed correspondence is provided in **Appendix I** – Consultation Report.

Table 9-3: Summary of Comments and Questions from Henvey Inlet First Nation

Topic / Theme	Summary of Questions & Comments	Henvey Inlet Wind's Response/ Consideration of Comments & Questions
Number and Location of WTGs	Information was requested regarding the number and location of WTGs within the HIWEC.	Approximately 100 to 120 WTGs have been assessed for the HIWEC; however, up to approximately 91 WTGs will be constructed for HIWEC. The location of the proposed WTGs is provided in this Final Draft EA Report and was presented on the information boards, and the hand-out maps distributed at CIC #2.
Effects on Wildlife and Habitat	Questions were asked and concerns expressed regarding the effects of WTGs and their construction / operations (including vibration, access roads and pollution) on wildlife and habitat, including waterbodies.	The potential impacts and mitigation measures have been identified and are documented as part of this Final Draft EA Report. Care is taken around wildlife and their habitat during the design, construction and operation of the WTGs. For example, knowledge of species and habitats that are present in wetlands is used to determine the construction timing; infrastructure such as culverts is built to maintain surface water drainage and patterns; and spill kits are kept onsite in the rare event of a spill.
Species Identification and Monitoring	Clarification was sought around what species were identified in the study area and how these species would be monitored. In particular, community members asked about the fish species and the Northern Cardinal.	Breeding surveys conducted in 2013 identified the Northern Cardinal in the study area but has not been confirmed during the most recent 2015 field season. The fish community sampling results conducted in 2015 are documented in this Final Draft EA Report. Monitoring of species begins post-construction. However, the monitoring requirements for these species have also been identified during the EA process and are provided within this Final Draft EA Report.
Additional Species for Consideration	Consultation with the community identified additional important species for consideration during the EA process, including the Sandhill Crane and plants used for medicinal purposes.	Sandhill Crane is not a SOCC; however, the presence and potential effects to Sandhill Crane populations were addressed as part of this Final Draft EA Report. A list of plant species was provided to HIFN in 2015. While it was disclosed in 2009 that all "existing" environmental regulations would guide the EA permitting process, additional informal efforts to capture traditional knowledge of medicines was undertaken. The community is currently engaging specialists in traditional medicine that will review the list of plant species provided and share findings with the community. Previous efforts included informal Elder site visits seeking guidance and input.
Addressing SAR	A number of concerns were expressed regarding SAR, including how they are addressed in the EA process and how they would be protected in the long-term.	The HIWEC study area provides habitat for several SAR. As such, a more comprehensive and conservative approach to addressing SAR, which includes both federally and provincially listed species, has been undertaken for the HIWEC. Experts have completed a thorough study of the area as part of the EA planning process to determine if there could be any effects to SAR, and in cases where potential impacts were identified, mitigation measures have been developed for construction and operational activities to avoid or reduce the impact to these species to the extent possible. In addition, construction and operational monitoring will ensure that these mitigation measures are implemented and a post-construction monitoring and follow-up plan will be implemented to determine any lasting effects to these species and if the mitigation measures were successful. These mitigation measures and monitoring plans were developed in consultation with EC. In addition, we are required to provide information on SAR to EC to determine if we need a permit for specific species. With this information, we will also be proposing species specific mitigation plans to minimize any residual effects to SAR. Should a permit be required, further requirements from EC will be stipulated and adhered to during construction and operation.

Table 9-3: Summary of Comments and Questions from Henvey Inlet First Nation

Topic / Theme	Summary of Questions & Comments	Henvey Inlet Wind's Response/ Consideration of Comments & Questions
Jobs Opportunities through the HIWEC	Interest was expressed in the job opportunities created by the HIWEC. Community members wanted to know about the types of jobs that will be available and how they can become informed.	Various jobs will be available through the HIWEC including labourers, equipment operators, safety and civil inspectors, environmental and archaeological inspectors, security and administrative assistants. There will be approximately 500 jobs during peak construction, 24 direct post-construction and 100+ indirect during construction. First consideration for jobs will be given to HIFN Band Members. Job and education announcements will be posted on the HIFN website.
Other Important Areas Identified by HIFN	The community identified additional areas of Aboriginal interest, including fasting grounds, for consideration in the EA. In addition, they questioned why Nishshing Aki were not identified on the HIWEC study area map presented at CIC #2.	The additional areas of interest were noted by the HIW team and have been incorporated as part of the EA planning process. Nishshing Aki were not identified on the map because this map is being made public, and the information is considered confidential outside of HIFN. In addition to previously identifying long standing sensitive sites and blacking-out no-go zones, a map officially identifying and approving protected sites; Nishshing Aki has been created specifically for the community and will be distributed to Band Members by the HIFN environmental consultant.
EA Process	Clarification questions regarding the EA process were asked by the community, specifically in regards to who was involved in the creation of the HIFN EA Guidance document, how the Transmission Line EA process differs from the HIWEC process, and the review process of the Final Draft EA Report.	The EA Guidance document was developed based on the principles outlined in the HIFN EA Regime. The EA will "consider federal environmental protection laws and standards of environmental protection similar to those applied to wind energy generation facilities located in Ontario, not on Reserve lands." (HIFN, 2015). Nigig and Pattern worked together with their respective legal counsels' and EA experts to develop an EA process that was no less rigorous than existing provincial and federal standards for similar wind energy generation facilities in Ontario. A third party reviewer has been retained by HIFN to review the EA and will make recommendations and provide advice to HIFN with regards to the EA. Since the HIWEC is located on-Reserve and is subject to neither federal nor provincial regulation, HIFN hired the third party reviewer to provide additional technical review and verification of the work that AECOM is doing in support of the EA. The Final Draft EA Report was made available to the community for a 30-day review and comment period. Only the Band Council has the authority to change the review and comment period timelines. Since the Transmission Line is off-Reserve, the EA process is required to follow O.Reg. 116/01, Electricity Project Regulation. This EA process is similar to the one that the HIWEC follows including field studies, determination of impact and mitigation and consultation with Aboriginal communities, agencies and the public, etc. The main difference is the fact that the provincial process is a self-assessment process and an "official" signed approval from the MOECC is not required. However, if the process is not followed, there is recourse by the provincial government and the public. There are several other differences including, for example, provincial agency input and the provision of a Statement of Completion at the end of the EA process.

Table 9-3: Summary of Comments and Questions from Henvey Inlet First Nation

Topic / Theme	Summary of Questions & Comments	Henvey Inlet Wind's Response/ Consideration of Comments & Questions
Consultation and Engagement	A number of suggestions were made by the community to improve consultation and engagement during the EA process. The suggestions include involving Elders in HIWEC planning, having a translator present at meetings with Elders, having more detailed and larger maps at the community meetings, setting up a door prize draw, providing meals to encourage people to attend and hosting additional meetings for other Band Members including those residing off-Reserve.	The HIW team has reviewed these requests and implemented the following: additional Elder meetings have taken place with planned follow-up, Council representation where Elders were taken to the sites around HIWEC, larger and more detailed maps were provided at the second CIC, and dinner and door prizes were given out at the second CIC. Council is also in the process of planning further engagement and consultation opportunities to build awareness within the community in the following months; this effort includes meetings with HIFN Band Members residing off-Reserve plus additional layman's language mail-outs on land use, leasing and the environmental permit approval process, environmental protection and a site visit for interested community members to a similar facility.

Table 9-4: Summary of Comments and Questions from the Public

Topic/Theme	Summary of Questions & Comments	Henvey Inlet Wind's Response/ Consideration of Comments & Questions
WTG Setbacks	A number of concerns were expressed and questions asked about the proximity of WTGs to cottages, residences, waterbodies and other features, such as Key Harbour Lodge. Also, it was believed that HIW committed to a 1.5 km setback from Georgian Bay and Key River.	The setbacks for WTGs will vary, and at a minimum will be, for example: • 550 m from residence / cottages • 500 m from Georgian Bay • 120 m from the Key River • 1.73 km from Key Harbour Lodge With regard to the 1.5 km setback from the Key River and Georgian Bay, previous discussions were that this setback was intended as a high end target, but not promised. HIW has removed several turbines that were close to the Key River and Georgian Bay based on the original layout. This layout has been shown in the Final Draft EA Report.
Number and Location of WTGs	Information was requested regarding the number and the final location of WTGs within the HIWEC.	The EA assesses 120 WTGs for the HIWEC; however, only up to 91 WTGs will be constructed. The location of the proposed WTGs is provided in this Final Draft EA Report. The final location of WTGs has not yet been determined as further detailed design, geotechnical investigations, and comments from HIFN, agencies and the public on the Final Draft EA Report are still to be evaluated. The public will be notified when the final WTG locations are known.
Decommissioning	Questions were asked regarding the state of the land after decommissioning and the funding available to ensure that it will be returned to its pre-construction state.	The HIWEC will be decommissioned in accordance with the Decommissioning Plan (**Appendix D**). Generally, the WTGs and TSs will be removed. HIFN will determine if access roads and collector lines will be removed at the time of decommissioning. HIW is responsible for the cost of decommissioning. HIW has committed to decommissioning the HIWEC in the Decommissioning Plan Report.
WTG Specifications and Planning	Inquiries regarding the planning and specifications of the WTG including the type / model, size, hub height, collector system and timeline for installation.	Construction is set to begin in May 2016. All of the WTGs will be the same height and model – the Vestas V126-3.3 MW. Technical specifications are provided in the Wind Turbine Specification Report.
Effects on Wildlife and Habitat	Many expressed concern regarding the effects of WTGs (noise and vibration), construction and the access road network on wildlife and habitat, including SAR.	The potential impacts and mitigation measures have been identified and are documented as part of this Final Draft EA Report. Care has and will be taken around wildlife and their habitat during the design, construction and operation of the WTGs and access roads. For example, knowledge of species and habitats that are present was used to determine the construction timing; infrastructure such as culverts will be built to maintain surface water drainage patterns and habitat connectivity; and spill kits will be kept onsite to be used in the event of a spill. After construction most species return to normal cycles post-construction. In addition, the WTG are located on rock outcrops, not in wetlands, also helping to minimize environmental impacts. Road installations and water crossings will be subject to controls to minimize environmental effects.

Table 9-4: Summary of Comments and Questions from the Public

Topic/Theme	Summary of Questions & Comments	Henvey Inlet Wind's Response/ Consideration of Comments & Questions
Adequacy of Field Studies	Field studies are required over a number of years to sufficiently study the wildlife in the area and how they might be impacted.	This EA had a long running environmental field component of five (5) years, compared to other EAs which are typically one (1) to two (2) years for a development of this size. These field studies included wildlife habitat and vegetation community mapping, as well as targeted migratory waterfowl, migratory passerine, migratory raptor, breeding bird, bat, snake, turtle, vascular plant and amphibian surveys within the HIWEC study area. The information about wildlife and wildlife habitats collected through these field studies was used identify potential effects of the HIWEC on wildlife and develop appropriate mitigation measures and monitoring commitments to avoid or minimize these effects.
Effects to Water Quality	Some concerns related to water quality impacts due to blasting.	Prior to blasting, the blasting Contractor will prepare a Blasting Plan which, amongst other things, provide measures to ensure that water quality will not be impacted. In addition, mitigation measures have been included in this Final Draft EA Report.
EA process	Concern was raised that the EA process was too fast. Further information was requested regarding the reviewers of the EA, including the third-party peer reviewer and the EC-CWS reviewer.	Field studies and information gathering for the EA process has been going on since 2011 and consultation has occurred since 2008. The timeframe to complete the EA process is relatively standard for this type of EA in Canada. A third party reviewer has been retained by HIFN for the EA. HIFN's third party reviewer will make recommendations and provide advice to HIFN with regards to the EA. At the time of publishing this Report, the name of the EC-CWS reviewer is unknown.
Management of Access Roads	Some concern was raised regarding how the access roads would be constructed and managed to ensure minimal impacts and limited access. A concern was raised regarding the impacts of invasive species entering via the access road network.	We have planned and designed the access roads to have minimal impact on the environment. These roads are primarily located in upland areas and away from any wetland and watercourses with the exception of a couple of locations where the access road must cross or come near a wetland / watercourse. We have minimized the width of the access roads and have insured that there will be proper drainage. In order to limit access, gates will be installed at the entrance of the two (2) access roads at Highway 69 and full time staff will be present daily at the HIWEC during operations.
Health Effects of WTGs	A number of questions and concerns were raised regarding the potential health effects of WTGs including noise, vibration, lights and shadow flicker.	The balance of scientific evidence and human experience to date clearly concludes that sound from WTGs does not adversely impact human health. These conclusions are supported by a body of work by medical and scientific experts. Ontario doctors, nurses, and other health professionals support energy conservation combined with wind and solar power to help us move away from the use of coal for energy generation, because burning coal to generate electricity has been proven to cause negative health effects in humans and wildlife. More than 80 countries around the world are using commercial wind power today, and wind energy is broadly understood to be one of the safest and most environmentally-friendly forms of electricity generation. With more than 320,000 MW of installed wind energy capacity and 225,000 WTGs operating around the world, hundreds of thousands of people live near and work at operating wind projects. In the province of Ontario, a number of appeals of wind projects have been heard by the Environmental Review Tribunal (ERT) on grounds that the projects would cause serious harm to human health. None of the appeals were successful.

Table 9-4: Summary of Comments and Questions from the Public

Topic/Theme	Summary of Questions & Comments	Henvey Inlet Wind's Response/ Consideration of Comments & Questions
Safety Concerns	Safety concerns related to WTGs were identified, including the impacts of mechanical malfunctions and ice throw on people, residences and the snowmobile trail as well as the management of fire.	Since cottages are no closer than 550 m from the WTGs and the WTGs are approximately 160 m to 180 m in height, no part of the WTG, even with the blades in motion, can land on a residence. Ice accumulation on the blades and ice throw is possible under certain conditions (i.e., low temperature and high humidity). The HIWEC will implement measures to prevent ice throw and the WTGs have the ability to be shut down in times of predicted high probability of ice accumulation events. With respect to ice throw on the snowmobile trail, HIW has removed the turbines that are directly adjacent to the snowmobile trail. With respect to a potential fire, WTGs are equipped with sensors that will alert the on-site staff who will respond accordingly.
Impacts to Tourism and the Visual Landscape	The public expressed concern regarding the impact of the WTGs on the natural beauty of the landscape, and the effects of this for tourists visiting areas such as French River Provincial Park. The accuracy of the visual renderings shown at the public meeting was questioned.	The WTGs will be sited with a 500 m minimum setback from the Georgian Bay shoreline and will therefore have minimal visual impacts on the shoreline. Revisions have been made to one of the visual renderings based on feedback received at PIC #2.
Impacts to Property	Questions were asked regarding the potential impacts of HIWEC to both property taxes and property value.	With respect to property values, the Municipal Property Assessment Corporation (MPAC) in the MPAC News dated Summer 2012, stated the following: "When assessing any property, MPAC relies on the market to indicate the level of influence that a factor, such as WTGs, may have on property's values. This is done through ongoing study and analysis of the market including the investigation of sales transactions. This market analysis typically reveals whether or not a factor has a negative or positive impact on a property's value. To date, MPAC's analysis of sales has indicated that the presence of WTGs that are either abutting or in close proximity to a property has neither a positive nor negative impact on its value. On March 29, 2012, the Assessment Review Board, an independent tribunal of the Ontario Ministry of the Attorney General, released a decision respecting a property located on Wolfe Island. The Board found that based on the evidence in this case there appeared to be no evidence of any negative impact to the value of the property". (Source: http://www.mpac.ca/pdf/MPACNewsSummer2012.pdf)

Table 9-4: Summary of Comments and Questions from the Public

Topic/Theme	Summary of Questions & Comments	Henvey Inlet Wind's Response/ Consideration of Comments & Questions
Transmission Line	Clarification regarding details of the transmission line route was requested, including the reasoning behind the two alternatives, the location of the poles and power lines, the long-term effects of transmitting power along these lines, and the timelines for approval and construction.	The proposed Transmission Line has been assessed under O.Reg. 116/01 and is classified as a "Category B" Environmental Review as per the MOECC's "*Guide to Environmental Assessment Requirements for Electricity Projects*" (2011). **Volume B** documents the EA process undertaken for the off-Reserve Transmission Line. The HIW FIT Contract awarded in 2011 has an approved interconnection point south of Parry Sound to the 230 kV HONI system (Route B). In addition to the assessment of interconnection of Route B, HIW in close consultation and discussions with IESO, HONI and expert consultants, conducted a technical and legal assessment of the possibility of amending the FIT Contract to permit interconnection at the HONI 500 kV circuit (Route A) to reduce the overall length of transmission required for the HIWEC. The FIT Contract amendment was not approved and the assessment has resulted in the conclusion that the current technically and legally viable interconnection point for the HIWEC is the connection point south of Parry Sound to the 230 kV HONI system (Route B), and HIW will continue exclusive assessment and development of that interconnection point and the associated Transmission Line. The pole / tower height will be 20 m to 50 m and the typical span of the poles / towers will be 170 m to 230 m, but may be longer in specific areas. The target construction start is May 2016 and target operations start is February 2018.
Impacts to Local Infrastructure	Questions were asked on whether the HIWEC would impact local radar facilities, the Ornge helipad which is required for emergency services, and water wells and the water table.	HIW has discussed the potential impact to radar facilities with the owners of these facilities (e.g., DND and EC). DND has stated that the WTGs will not impact their facilities and we are in discussions with EC with respect to their facility in Britt. With respect to the Ornge helipad, HIW will provide NAV Canada with specific information about the location of the WTGs in order to determine if there is any impact to navigational safety. Once the layout is finalized, HIW will submit this information to NAV CANADA for their evaluation. In addition, Transport Canada will stipulate the lighting schematic of the HIWEC in order that the WTGs will be clearly visible to air traffic. With respect to water wells, it is highly unlikely that any water wells will be impacted by construction activities; however, a survey and monitoring of water wells will be undertaken as a precaution. If residents notice any change in their well, they can contact HIW.
Public Consultation and Engagement	The public wants to ensure that there is adequate opportunity to provide input and that their input is being considered. Suggestions were provided to improve consultation including reaching out to other groups such as the Key Harbour Cottage Association and other First Nations communities, hosting meetings at appropriate times of the year to ensure cottager involvement, including a presentation and question and answer session at the meetings and having maps available.	HIW is committed to engaging all interested stakeholders in a way that is meaningful and transparent. The KRAA (formerly the Key Harbour Association) was added to the HIWEC contact list and has since been sent updates of key events and milestones related to the HIWEC. A meeting with KRAA's members was held on August 15, 2015 where HIW provided a presentation. KRAA members asked numerous questions which were answered. A revised layout was provided which removed 20 WTGs. To ensure involvement of cottagers, PIC #2 was held on Saturday, July 25, 2015. The date was selected on a weekend during summer to encourage and maximize attendance of cottagers in the area. In addition, more detailed maps were able to be provided at PIC #2. HIW is committed to ensure that consideration is given to public suggestions. Comments and suggestions received throughout the EA process have been documented and provide as part of this Final Draft EA Report.

10. Conclusion

As part of the HIFN Environmental Stewardship Regime, the HIWEC EA was conducted in accordance with these principles, applicable HIFN laws, and approved HIFN EA Guidance. The results of this report have concluded that the HIWEC will not have significant adverse residual effects on any Nishshing Aki, biophysical or socio-economic VECs provided the mitigation measures identified in **Section 6**, the EPP (**Section 7**) and the follow-up and monitoring plans (**Section 8**) are implemented as appropriate during construction / decommissioning and operations. In addition, HIW is committed to developing a detailed monitoring and follow-up program and, if required, a compensation plan based on the results of the monitoring and follow-up program.

The potential residual environmental effects for other environmental effects such as accidents and malfunctions, and effects of the environment on the HIWEC were also found to not be significant. The EA determined that the only environmental effects due to such events that could not be mitigated would be a forest fire or extreme winds. These environmental effects were predicted to be highly unlikely to occur.

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